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AN ANALYSIS OF STRUCTURES IMPLEMENTED  
TO RESOLVE LAND USE CONFLICT AND OVERSTOCKING  
BY MASAI PASTORALISTS IN KAJIADO DISTRICT, KENYA

By

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A PLAN B PAPER

Submitted to  
Michigan State University  
in partial fulfillment of the requirements  
for the degree of

MASTER OF SCIENCE

Department of Agricultural Economics

1980

## ABSTRACT

This paper evaluates two recently implemented strategies to control land use conflict and overgrazing in Kajiado District of southern Kenya, stressing the importance of analyzing attempts to alter traditional pastoralist production systems in terms of the "complex ethno-ecological mosaic in which political power allocates access to strategic resources" (Horowitz, 1978, p. 1). A situation, structure, performance paradigm is applied to the problem.

Factors central to the situation which underlie the issue of overgrazing are grounded in the ecological and historical context. Highly unpredictable rainfall, repeated drought, and an increasingly constricted resource base form the primary constraints of the Masai production system. In response, complex cultural adaptations and herd management strategies have evolved to provide maximum security and support for the institution of the family. It is these social factors which must be kept in mind as the evaluation of intervention strategies proceeds.

Two intervention strategies designed to address the issue of overstocking from slightly different perspectives are described in detail and then evaluated in terms of their likely performance outcomes. These strategies are land adjudication into group ranches, and the payment of Wildlife Utilization Fees to group ranches bordering on the national parks. For a number of reasons; especially those related to property rights, and the costs of obtaining information, reaching agreement,

and enforcing decisions; it appears unlikely that either strategy will be very effective in changing herd management practices such as mobility or the stocking of large numbers.

## ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to my major professor, Dr. Allan Schmid, for his encouragement and support. His capacity for careful analysis has been an inspiration. My thanks are also extended to the members of my committee, Dr. Lawrence Libby and Dr. Raleigh Barlowe, for their helpful comments and recommendations.

The assistance of Dr. David Campbell has been invaluable in the preparation of this paper. It was Dr. Campbell's own work on the topic which first excited my interest, and his willingness to provide access to his personal files and materials has made the research possible.

The supportive staff of the African Studies Center deserve much of the credit for anything I might have accomplished in the past two years. Without the financial assistance of the NDFL Area Studies Fellowship my graduate work would not have been possible. Special thanks are due to Anne Schneller and Dr. David Wiley who have always been available to answer questions and provide encouragement.

I wish to thank Cindy Cordes for all her assistance in the preparation of the final draft of this manuscript. She's been most understanding of the demands of a frantic graduate student.

Most importantly, I am indebted to my loving husband, Laker, whose trust and encouragement were the precondition for all of my efforts and who endured a long year of separation because he believed in me.

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## I. INTRODUCTION

The African continent contains a number of ecological niches which, while capable of supporting large numbers of various wildlife species, have insufficient rainfall to support extensive settled agriculture. Historically, these niches have been occupied by "semi-nomadic" pastoralist peoples whose herds coexisted with the wildlife with varying degrees of competition for resources. History, however, has not left these people untouched. Colonialism, independence, and the introduction of modern technology have impacted upon their resource base and their lifestyle. "Economic development" has become a catch phrase. Various interventions have been attempted by national governments and international agencies with debatable success, a hardly surprising outcome considering the poorly defined and often contradictory concepts extant concerning the criteria by which success might be measured.

In his 1978 review of the state of current knowledge concerning the social and economic impact of livestock projects on low income peoples, Michael M. Horowitz asserted that "the appropriate focus for understanding these [development] activities . . . is the region itself, the complex ethno-ecological mosaic, in which political power allocates access to strategic resources and their rewards" (Horowitz, 1978, p. 1). In short, he emphasizes the need to understand economic development in a structural context which recognizes the constraints imposed by socially and ecologically created interdependencies.

The purpose of this paper is to explore the insights provided by the application of a situation, structure, performance paradigm to the question of economic development for the pastoralist Masai of Kajiado District in southern Kenya. This paradigm specifically places current development policies into a social, ecological and historical context. On the basis of insights thus gained, hypotheses are generated regarding the potential performance outcomes to be expected from the introduction of specific structural interventions. Two development policies will be analyzed. These are the adjudication of land into group ranches and the payment of Wildlife Utilization fees.

Kajiado District holds an important position in the concerns of those responsible for rural development in Kenya. Not only has Kajiado District functioned as a model district in terms of Kenyan policies toward pastoralist development in recent years, but in addition the district contains two of Kenya's most popular, accessible, and hence profitable game parks and is thus central to the development of Kenya's important tourist industry.

In response to the increasing competition for land and grazing resources between wildlife, pastoralists and agriculturalist settlers, substantial amounts of information about the district have been gathered by the UNDP sponsored, FAO executed, Kenya Wildlife Management Project between 1971 and 1977. In addition, a number of studies have been conducted by various scholars connected with the Institute for Development Studies at the University of Nairobi. These studies form the information base for the following analysis.

The analysis begins as Horowitz suggests with a detailed description of the region itself. Chapter II places the issue of overgrazing and



land use competition in an ecological context, while Chapter III expands the perspective from static description, introducing the dynamism of historical development. Chapter IV builds upon the preceding background to explore the structure of the Masai subsistence production economy as it has evolved in response to the historical and ecological constraints within which it operates. Special emphasis is placed on the objective function of the Masai people, for herd management strategies must be understood in light of the objectives they are designed to meet. It is concluded that, while the problem of overstocking may have been overstressed by colonial administrators, current herd management practices, a growing pastoralist population, and a diminished resource base make it a very real problem for the future.

In light of this conclusion, the question of alternatives arises. Two government policies are to be analyzed. Chapter V describes the structure of the land adjudication policy in Kajiado District which forms a cornerstone for livestock development, as it was conceived by development agencies and government. To follow up, Chapter VI then looks at the reality of policy implementation. Serious questions are raised concerning the potential performance impacts of the structure as implemented. It is concluded that land adjudication and the organization of group ranches per se are unlikely to alter herd management behavior based on strategies of mobility, reciprocity, and herd accumulation.

The second policy proposal to be investigated arises in response to governmental concerns about the threat overstocking poses to potential wildlife utilization. A central issue is the divergence between performance objectives of the Masai pastoralists and the government as representatives of the national economy. Chapter VII explores further this divergence in

performance objectives, and indicates why a policy to halt overstocking was needed from a wildlife conservation perspective. It also discusses the rationale for diverting benefits from wildlife preservation into the pockets of the Masai group ranchers. To accomplish this, a system of Wildlife Utilization Fees (WUF) has been proposed and partially implemented to provide incentive for controlled stocking levels. Its structure is described in Chapter VIII and its potential performance is evaluated in Chapter IX.

Like the policy of land adjudication, it appears that the Wildlife Utilization Fee payments remain plagued by the divergence between individual and group objectives and by the cost of decision making and enforcement. As pointed out in the Summary and Conclusions in Chapter X, the difficult transition from a status grant system based on reciprocity to a monetarized market economy has yet to be accomplished.

## II. THE ECOLOGICAL AND GEOGRAPHICAL CONTEXT

Kajiado District covers 21,105 square kilometers from just south of the Nairobi suburbs to the Tanzanian border (Figure 1). It is comprised largely of semiarid grasslands with insufficient rainfall to support rainfed agriculture except in a few isolated pockets having higher elevation and greater precipitation, notably the northern foothills of Kilimanjaro in the Loitokitok area and the Ngong Hills near Nairobi. Agriculture is estimated to cover approximately two percent of the district's land area. Slightly less than one percent is covered by water. The remainder of the district's land area is dominated by stock rearing and wildlife range.

The rainfall regime is bimodal, peaking in March to May and again in October to December. Average rainfall is below 500 millimeters over much of the area, while the Ngong Hills and Kilimanjaro area receive a little more than 750 millimeters on average. However, precipitation is highly erratic in time and space. Figure 2, which represents the annual rainfall probabilities for the two operating meteorological stations in the district, illustrates the broad range of precipitation levels possible. Drought is a persistent and reoccurring problem. Major droughts have been recorded for the district in 1933-35, 1943-46, 1948-89, 1952-53, 1960-61, and 1972-76. Non-drought years are often characterized by the failure of rains in smaller segments of the district.

Climate and access to water, rather than soil type, form the primary determinators of vegetation cover. The higher foothills are forested

FIGURE 1

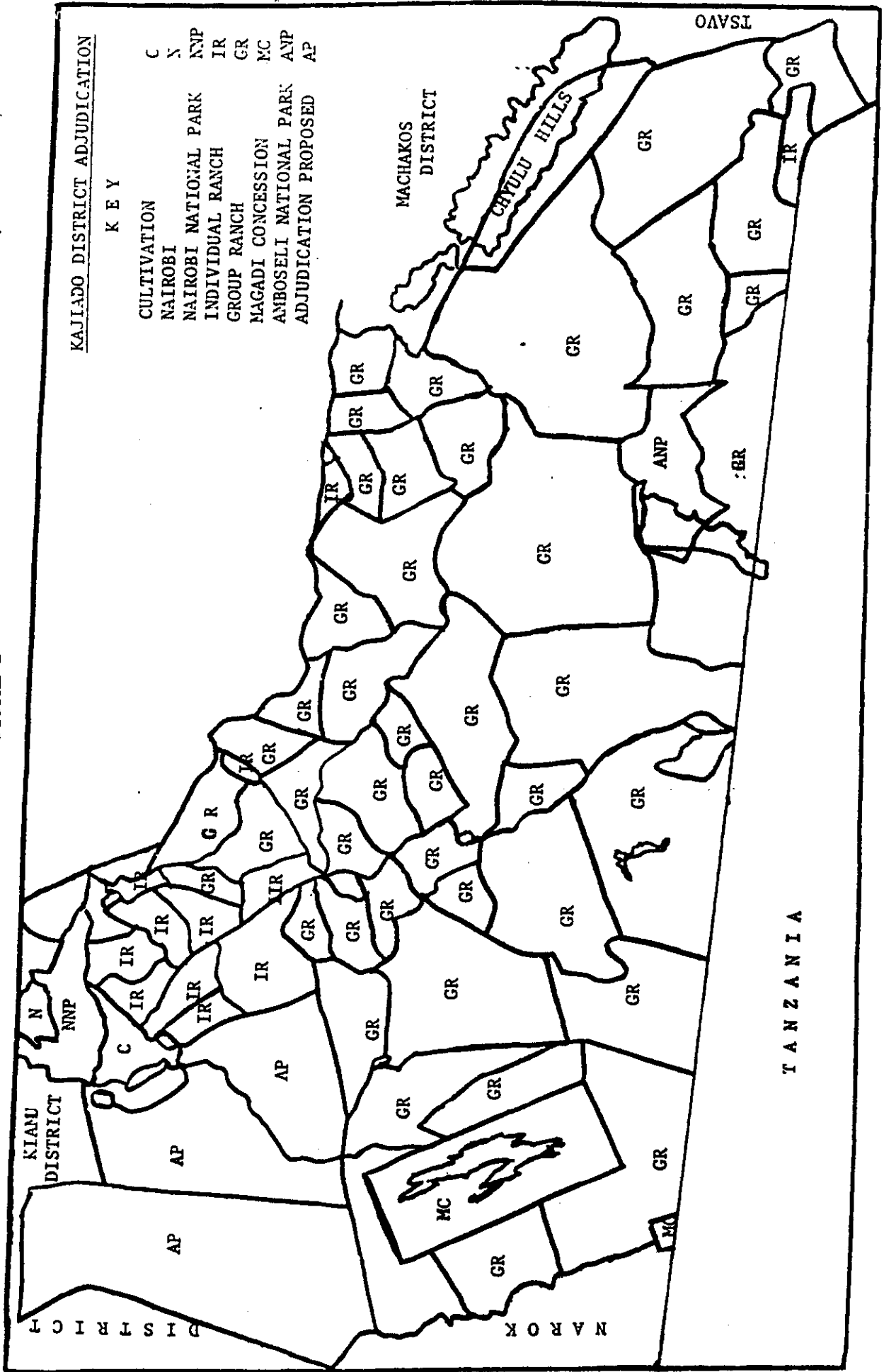
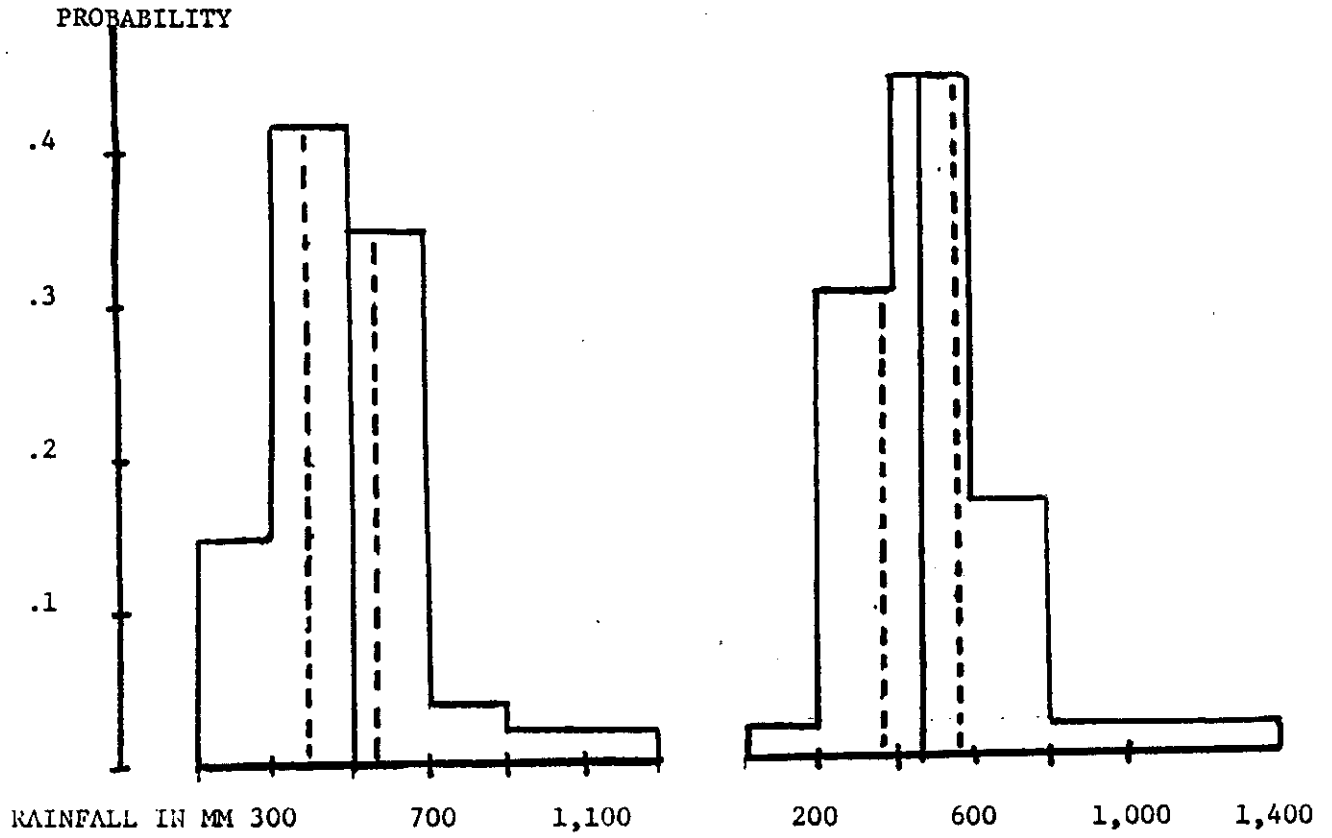


FIGURE 2

ANNUAL RAINFALL PROBABILITIES AT KAJIADO AND MAGADI



while riverines, swamps, and isolated sources of permanent water allow for more lush, dense vegetation than the arid plains.

In 1979 the human population was estimated at 107,000 of whom 70,000 are Masai (Meadows and White, 1979). Population density varies from 2 to 8 per square kilometer in the pastoralist areas to over 100 per square kilometer in the farming areas of Ngong and Loitokitok where the non-Masai populations are concentrated.

There are two urban centers in the district, Kajiado with a 1969 population estimate of 1,755 and Ngong with an estimated population of 1,583 (Kajiado District Development Plan, 1975). The district has a better road system than other pastoralist areas in Kenya, partly due to the need for access to national parks required by the tourist industry. A paved road and railway parallels the northern border of the district. A second paved highway bisects the district north to south from Nairobi to the Tanzanian border.

Two major national parks have been established in the district. Nairobi National Park in the north has an area of 118 square kilometers while Amboseli National Park covers 388 square kilometers. Tsavo National Park lies in Machacos District on the eastern border of Kajiado. In addition, two game reserves, Chulu Hills and Magadi Conserve, are located in high rainfall areas within the district. National parks are reserved for the exclusive use of wildlife. In contrast, while wildlife is protected in the game reserves, the grazing of domestic herds is not prohibited.

### III. THE HISTORICAL CONTEXT

The changing picture of land use patterns in Kajiado District is a response to political and population pressures on a finite resource base characterized by periodic and widespread drought. The four main actors in the drama are the pastoralists, the agriculturalists, the wildlife, and the government (be it colonial or post independence).

Prior to colonial intervention, large areas of Kenya (and Tanzania) were dominated by the Masai who evolved a self-sustaining pastoralist economy which was well adapted to the vagaries and risks of periodic drought. The Masai lived in peaceful coexistence with the abundant wildlife populations of the area. Threatening predators were hunted and during extensive drought wild ungulates were utilized as "second cattle" providing emergency food sources. In general the wildlife and domestic herds shared range resources.

A group of more agricultural Masai did settle temporarily in the foothills of Kilimanjaro during the mid 1800s, but they were expelled by purely pastoralist sections during the intersectoral warfare which characterized the end of the century.

In addition to widespread intersectoral warfare, the late 1800s were a time of major epidemics among both human and animal populations. From 1870-1900 both cholera and smallpox decimated segments of the population. The 1880 drought was followed by epidemics of rinderpest and contagious pleuro-pneumonia, further reducing the Masai herds.

The reduced human population and weakened subsistence base at the time of colonial penetration, combined with a conscious British policy of avoiding armed conflict, resulted in the relatively peaceful opening up of large segments of Masai territory for colonial settlement. The Kenya Masai were restricted to the Southern Reserve by the treaties of 1904, 1911, and 1912. The Masai reserve occupied what are now Narok and Kajiado districts. The size of the reserve appeared to contain more than sufficient dry and wet season graze to accommodate the herd populations of the time. Restrictions on the movement of cattle populations imposed by the colonial administration to protect the interests of settlers concerned about the transmission of stock diseases acted to effectively block the supply of Boran breeding bulls traditionally obtained from pastoralists in northern Kenya. Helland (1978) contends that this impediment to selective breeding continued as late as 1961, effectively reducing the productivity of Masai herds.

Contrary to Masai hopes, the designation of the Masai reserve did not guarantee exclusive land use rights to the pastoralists. As the number of white settlers and the areas of commercial cultivation expanded in the White Highlands, the pressure for land in the Kikuyu reserve began to push Kikuyu settlers into the higher potential areas of the Ngong Hills. At the same time, in the southern end of the district, the importation of a large number of Kamba and Chagga laborers to build an administrative post in Loitokitok resulted in many staying to settle on the slopes of Kilimanjaro. In both areas intermarriage took place. The Kikuyu or Chagga wives of pastoralists often farmed small plots to supplement the family food base and frequently invited other members of their extended family to join them in the relatively unsettled foothills.



The government became actively involved in the area at this time for a number of reasons. During periods of reoccurring drought there was evidence of considerable soil erosion and degradation of graze. Stock numbers were repeatedly blamed for this range deterioration and active efforts to promote destocking were undertaken. Destocking was not made compulsory as it was among the Kamba, but government controlled livestock markets were instituted. Extremely high overhead costs, however, promoted a low price policy and in the early years about twice as much stock was sold through unofficial private markets as was officially sold to the government. Attempts at destocking had marginal impact at most. The government was also concerned by the extent of forest clearance undertaken by the newly immigrated farmers as it resulted in substantial erosion of the upland areas. Terracing was actively promoted, and in 1939 a number of settlers were removed after 70 acres of forest had been cleared and soil erosion ensued.

The period from 1940-1960 was a time of social upheaval and political uncertainty. World War II was followed by the struggles for independence, and through it all the competition for access to land intensified.

During World War II the subsistence base of the Masai was drastically eroded. A system of forced sales of livestock was instituted by the government requiring a quota of 2,000 head of Masai cattle per month for the duration of the war. Despite a severe drought from 1943-46, wartime sales totaled 66,333. This is estimated to represent 75% of all males over 3 years of age, an extremely high figure given the additional slaughter for meat required by drought caused food shortages (Meadows and White, 1979).

The area under cultivation continued to expand due to continued

Kikuyu migration, wartime emergency government wheat cultivation (3,000 acres), and growing numbers of Masai cultivating crops to offset the drought. Competition for dry season graze became a substantial problem as did deforestation and soil erosion. As Campbell points out,

The costs and benefits of extensive cultivation were demonstrated during the drought of 1948-49 in the Loitokitok area as conflict between the Masai herders and Kikuyu and Chagga farmers resulted from the Masai grazing livestock on the farms as grazing was scarce elsewhere and as famine was averted by the availability of maize from these farms. (Campbell, July 1979, p. 8.)

Several unsuccessful attempts to restrict cultivation were made in response to serious conflicts over access to dry season graze, but the declaration of the emergency abruptly changed the situation as massive numbers of Kikuyu farmers were repatriated to the Kikuyu reserve from the Ngong and Loitokitok areas in 1952 and 1953.

The shortage of dry season graze, about which the Masai were deeply concerned, was exacerbated by the National Parks Ordinance of 1945 which authorized specific areas to be set aside exclusively for wildlife as national parks. It also provided for the creation of national reserves which were to be controlled by County Councils but which did not preclude access by pastoralists. The declaration of national parks and game reserves is made official by publication of their borders in the government gazette, thus arises the phrase "gazetting of national parks." The people of Kajiado District were affected by the gazetting of Nairobi National Park in 1945 and of Tsavo National Park and Amboselli National Reserve in 1948, all of which contained vital grazing and water resources traditionally used by the pastoralists. In this manner the wildlife which had coexisted for centuries with Masai pastoralists was legitimized as an exclusive land use, initially for conservation purposes and later as an important

segment of the monetarized economy.

The late 1950s proved to be a prosperous time for the Masai pastoralists due to good weather conditions, range improvements, increased veterinary services, and the development of competitive outlets for livestock. The increase in offtake rates to 13% in 1956 was matched by total herd expansion. By 1960 the Masai had more cattle than at any time since the arrival of the Europeans (630,000 head). But the good times did not last. The large number of stock depleted the range. When the 1960 drought hit, the impact was disastrous. By 1962 the cattle population had declined to only 208,000 (Meadows and White, 1979).

With the transition to independence came an emphasis on a new policy of land adjudication. The hope was that provision of legal title to land would encourage management with a view to sustained output. The small scale attempts initiated by the government at range management had failed. Perhaps land adjudication would solve the overstocking upon which range deterioration was blamed. The importance of marketing was recognized, and two new divisions of the Ministry of Agriculture were created. The Livestock Marketing Division was charged with the movement of livestock through stock routes and holding grounds to slaughter or finish. Better quality output was supposed to be reflected back to producers in higher prices. The Range Management Division was created to supervise the group ranches which were proposed under land adjudication.

The first area to be adjudicated was that around Ngong. Returning Kikuyu farmers began applying pressure in the late 1950s to demarcate plots. They wanted a guarantee that they could not once again be repatriated to the Kikuyu reserve as had happened during the emergency. Land titles were seen as a critical component of this guarantee. By the end

of 1964, over 8,000 hectares of the highest potential land in the district had been adjudicated into individual holdings.

Prior to independence a number of Masai leaders and government officials who realized the potential value of prime land in Kajiado District had managed to obtain deeds to large tracts of prime land. During the adjudication process much of this was subdivided and resold or rented for cultivation. In addition, between 1966-69 all of the potential farm land in the Loitokitok area was adjudicated including over 16,000 hectares on the northern slopes of Kilimanjaro. In effect, the process of land adjudication secured the rights of immigrant farmers to the best land in the district; land suited for cultivation, but which also served as the primary dry season range for pastoralists, especially in drought years.

Concerned that after independence the land guarantees of the treaties of 1911 and 1912 would no longer apply, the Masai welcomed the adjudication of graze land as a means of securing the land for themselves. As Campbell describes it:

The adjudication of the grazing land began in northern Kajiado with the demarcation of six individual ranches in 1962 and the Poka group ranch in 1964 (Halderman, 1972). It was soon realized that there was insufficient land to demarcate individual ranches for everyone and this together with the fears that many would become landless and that individual ranches might sell their land to immigrant farmers led to the general acceptance of the concept of group ranches (Hedlund, 1971). From 1964 onwards the emphasis throughout the district was on the demarcation of group ranches and by 1976 over thirty group ranches covering an area of 750,000 hectares and including over 5,700 owners existed in the district (Chemonics, 1977). (Campbell, July 1979, p. 13.)

The objectives of the pastoralists and government agencies were at odds in this process. The Masai welcomed land adjudication as a means of securing their rights to the land. For most, the ranches were viewed not as private property but as Masai property.

In contrast, government agencies were depending upon the sense of proprietorship to encourage better land use management. It was intended that ranches utilize their land title to secure loans for such infrastructure investments as cattle dips, boreholes, fences, etc. and that modern methods of rotational grazing be instituted with the assistance of Range Management Division advise. Land adjudication was assumed to be the key to a transition from traditional subsistence pastoralism into the modern sector. It is this assumption that needs to be tested in greater detail.

The historical process, then, is one of an increasingly constrained resource base for a growing population. The legalization of separate land use rights for wildlife and cultivation in highly watered areas has removed one of the safety valves of the traditional Masai system. During the years of high rainfall the grazing areas are relatively lush and competition for the foothills declines. In these years stock numbers expand dramatically while at the same time cultivation expands as well. Inevitably the droughts come. Now, however, the cultivated areas are off limits and the large numbers of stock will have begun to tax the wet season range even in good years.

The cry of government officials has long been that the primary constraint to livestock development is overstocking. The determination of carrying capacity, however, is difficult because it must be adjusted year to year on the basis of annual rainfall. In reality, the primary constraint is probably better described as the lack of institutions to facilitate the adjustment of stock numbers to the changes in carrying capacity brought on by drought. The stocking of large numbers of animals is a rational means of risk aversion when the herd manager can

expect to lose one third to one half of his herd in the next drought and there is no alternative institution which will allow him to easily reduce his herd for the duration of the drought, replenish it when the difficult times are over and still continue to feed his family. It is especially interesting to note the coincidence of major droughts, during which the district's carrying capacity was dramatically reduced, with each of the principal reviews of livestock development initiated by the government. The Carter Commission (1934), the post World War II period, the Swynerton Plan (1955), and the move to independence all coincided with periods of drought.

With the subsistence needs of an expanding population, however, the potentiality certainly exists for herd size to expand to the point of exceeding the long range carrying capacity of the district. Campbell (March 1979) estimates that the herd size required to simply meet subsistence needs of the pastoralist population will surpass the carrying capacity of the district by 1986, even assuming substantial improvement in range practices and productivity. This problem is exacerbated by the removal of high potential areas through cultivation. While these areas comprise only 2% of the district's land area they contain about 8% of the dry season graze during an average year (substantially more during periods of extended drought). These figures do not include the areas gazetted into national parks and therefore also off limits to graze.

Wildlife has become a key issue in recent years, not only from a conservation perspective, but as an important element in the foreign exchange earning capacity of the tourism industry. The major wildlife herds, however, cannot be contained in the national parks year around. Their migration patterns bring them onto group ranch land for extended

periods of time each year. During these times they compete to some extent with domestic stock for resources, and may damage crops as well. As sufficient grazing becomes an increasing problem, the willingness of Masai pastoralists to coexist with wildlife decreases and the wild herds are increasingly endangered. During drought years the situation is especially difficult.

The adjudication of individual farms has not solved the problems of the agriculturalists. The experience of recent immigrants during the 1972-76 drought was sobering. Crop failure was extensive and agriculturalists were unprepared to cope with such risks. Many farmers concerned with the need to store up reserves for drought years and to save cash are now anxious to expand their area under cultivation (Campbell, August 1979). This means moving into the more marginally productive areas. Since 1976 there has been increased cultivation along riverines, the edges of swamps, and other sources of permanent water. Such expansion into marginal areas further reduces dry season grazing and in the long run makes agriculturalists and pastoralists alike more vulnerable during droughts. In order to analyze the potential success of recent policies intended to ameliorate the problem of overstocking and range deterioration, it is necessary first to understand the Masai production system, its objectives and its constraints. This is the issue which the next chapter addresses.

#### IV. THE MASAI SUBSISTENCE PRODUCTION ECONOMY

In a subsistence production system such as that of the Masai, the social, cultural, economic, and productive aspects of life are inextricably intertwined. The culture as a package has evolved to cope with the time and location specific nature of the constraints and risks which the people face in their day to day lives. The primary constraint for the Masai is an environmental one, i.e. arid range land subject to repeated droughts. The pastoralist economy is ideally suited to bring such areas into production.

Unfortunately, because research into seminomadic production systems is difficult methodologically, the need for an economic analysis of the Masai production system has gone largely unmet.

An analysis of production economics must begin with the definition of the objective function. As Dyson-Hudson point out,

. . . one can hardly hope for an effective analysis of livestock-oriented groups without some sophisticated grasp of their central concern, viz how to achieve sufficient productivity from the manipulation of available livestock within the available environment so that people may be kept alive from one year to the next.

(Dyson-Hudson, 1972, p. 23)

As has been pointed out by a number of scholars (Helland, 1978; Meadows and White, 1979; and Campbell, August 1979) the Masai diet plays a major role in determining subsistence production herd management strategies. The traditional Masai diet is comprised almost entirely of milk, blood and meat from domestic herds of cattle, sheep and goats. Cow's milk forms the mainstay of the diet and is the preferred form of nourishment. However, given the wide variation in milk production



from wet to dry season, it is necessary to supplement the pure milk diet. During the dry season or at other times when milk is insufficient to meet family nutritional needs, the milk and meat of small stock and the blood of cattle provide an important nutritional supplement. They are, however, inferior goods. When available graze and herd composition allow, a pure milk diet is usually preferred. Thus, although small stock provide a safety valve, the production objective is still primarily the provision of sufficient lactating cows to feed the family unit.

Adequate household-level food consumption studies have yet to be conducted for the Masai, thus one is left with only educated speculation concerning the subsistence requirements of the Masai family. Daily milk production estimates per lactating Zebu cow vary from less than 1/4 liter during the dry season to 2-3 liters under excellent range conditions one to two months after calving. Cross bred cattle may be up to 50% higher (Billie, Eidheim and Wilson, 1979).

Traditionally the Zebu cattle of the Masai were cross bred with Boran bulls obtained through trade with pastoralist groups in northern Kenya. This practice was impeded when colonial policy closed the northern districts, barring all human and livestock movement in or out. Since the 1960's cross breeding has been reintroduced on a commercial basis especially by owners of individual ranches. Not surprisingly, it is well accepted by Masai who have the capital to undertake it. In 1974-75 it was estimated that about 20% of the female cattle population was cross bred (Billie, Eidheim, and Wilson, 1979).

The translation of such rough production estimates into minimum herd size necessary to support a Masai family depends upon a large number of assumptions. The estimate has varied from 30-35 head of

cattle for a family of eight (Brown, 1963) to 150-160 cattle for a family of 5 (Widstrand, 1972) depending upon estimates used concerning the calorie content of milk, the calorie requirements of a Masai adult, the percentage of herd population which is adult lactating female, and the extent to which milk is supplemented by meat or agricultural food sources.

To further complicate the matter, droughts take a heavy toll on herd populations. The Masai herd can be seen to go through major cycles of expansion and contraction with herd size peaking before each drought. For this reason Campbell takes a more pragmatic approach, estimating a minimum of 7 cattle per adult based on the rationale that this was the average pre drought cattle/adult ratio of a group of herders unable to meet subsistence needs during the 1974-76 drought (Campbell, March 1979).

Dependence upon herds for survival and the concomitant risk of loss due to drought, disease, theft, and predators, has resulted in the evolution of a number of risk averse herd management and range utilization practices. Because of the spatial and seasonal variation in precipitation, mobility of herds is a primary adaptive strategy. Any given pasture site will have a higher variability in pasture conditions than will the region as a whole. Complementing this fact, pasture is more nutritive during the growth cycle than when dry; containing a higher level of digestible protein and carbohydrates (Western, 1974). Since pastures are estimated to be 70% digestible when green but only 30% digestible when dry, failure to utilize range resources during the growth cycle results in a loss of potentially consumable energy. Mobility is a herd management strategy elected in response to a given

set of social and environmental conditions to optimize productivity and is closely monitored in terms of milk yields and health of the herd.

A natural complementarity exists among the areas of higher and lower elevation. When the rains first begin, fast growing grasses and herbs which are edible when young appear in the rocky areas. Later, the herds are grazed on the plains until the grass becomes too dry and coarse. Finally, during the driest season, the best graze is found on the slopes of hills, the fringes of swamps, and other areas of permanent water.

In addition, there is a complementarity in the mixed composition of the Masai herds. Cattle, sheep, and goats have different grazing needs, different susceptibilities to disease and drought, and serve different purposes in the subsistence production system. The smaller stock is often viewed as a highly productive but risky investment. A rancher trying to rebuild his herd after losses may invest heavily in small stock which reproduce more quickly and are easily sold. Gains thus earned can then be invested in cattle which are less likely to be wiped out in an epidemic.

To maximize the use of range, the boma (or household dwelling) is situated in an optimal relationship to permanent water, dry season graze, surface water, and wet season graze. The objective is to minimize the labor demanded by water carrying, herd movement, and household migration. Since unpredictable variations in range may necessitate either seasonal or semi-permanent movements of entire households, it is uneconomic to invest in immobile assets such as permanent structures.

With mobility playing a central role as a strategy of environmental adaptation, the Masai have elected to maintain common ownership of land resources while at the same time evolving highly individualized relationships of private ownership of livestock. Common ownership has been cited as the economic foundations of overgrazing and degradation of range (Livingston, January 1977). The argument of the "tragedy of the commons" proceeds as follows. As a utility maximizer, the individual herder will maximize his profit by utilizing the range to the fullest extent possible. The cost of excluding others from utilization of the common range is a disincentive to conservation. The restraint of one individual on his herd size simply allows others to expand their herds. In the long run individuals operating to maximize personal profits increase the total herd size to such an extent that deterioration of range results in an eventual cost to all in reduced carrying capacity of the range and lower productivity. This assessment of the negative results of common ownership comprises the foundation for development schemes predicated on land adjudication.

The full system of property rights is far more complex, however, than the assumption of individualized ownership of herds and community ownership of range implies. The harsh environmental conditions and risk involved in the pastoral subsistence production system result in an individual being highly dependent upon relationships with other people. The food supply is a function of herd size and herd size is necessarily limited by labor constraints. This interdependence has fostered the evolution of a number of social institutions designed to augment the survival capacity of the household and thus the society as a whole.

The social and political organization of the Masai pastoralists is complex. Traditionally the Masai were organized into a number of sections, each occupying a specific known territory. Each functioned as an autonomous political entity based on a loose confederation of localized age grade organizations, sometimes called subsections or localities. These secondary level units were relatively self contained ecological units known by the name of their permanent source of water and including both wet and dry season pasture. Each had its own council of elders for the settlement of disputes and enforcement of customary law. Age set activities were organized on this level. The subsection was not, however, tied by family relationships. Instead, households were free to move between subsections. Thus subsections were cross cut by clan relationships which are patrilineal in nature. While age grade activities were organized by subsection, all subsections had the same age grade structure. Hence age set loyalties also cut across subsections and clans. A complex network of loyalties, responsibilities and rights was established in this way, the full extent of which is not clearly documented. The baseline unit of the Masai social structure is the household.

Animal property rights are intimately connected with the cycle of household viability. While a household may be said to be constituted with a man's first marriage, the accumulation of the stock to feed the household begins in early childhood. In the Masai society stock is primarily acquired through a system of grants augmented by natural reproduction.

A boy is given gifts of livestock at all major ritual events in his life. The process begins with the naming ceremony during his first

year of life, at which time he is given a female animal. Other major events include the removal of the two front teeth of the lower jaw at age 6 to 8, circumcision (age 14 to 20) and the ceremonies which mark passage from being a moran (warrior) to senior moran (age 20 to 26). Each of these events is marked by the transfer of stock from family, relatives, and friends. With luck and proper management of the herd, the young man hopes to be able to afford the bride price and establish his own household after he has achieved senior moran status and is eligible to marry.

A woman also receives gifts of livestock during her childhood, although the custom is not as ritualized. Such stock may or may not be transferred to her husband's herd upon marriage. It is pointed out that there is wisdom in a woman keeping stock in her father's herd in case of divorce. The marriage is legalized by the binding promise of a man and his representative about the size and composition of the bride price. The bride price, however, may not be collected until well after the marriage ceremony, sometimes as late as the circumcision of the eldest son.

The married son will often stay in the boma of his father for a number of years during the initial phase of the household cycle when he has too few sons of his own to care for his herd. Eventually, if there are many sons, most will move away with their father's blessing to take over full management responsibilities of their herds and to join another boma as a separate household. Usually at least one son will remain as a boma partner with his father.

During the mid phase of the cycle, as a man acquires more children, especially sons to care for his herd and perhaps additional wives, the

household becomes more independently viable. Disolution begins when sons leave home and the parents age. At this time the household becomes less viable again and the elderly become part of the households of their children.

The delineation of animal ownership becomes more and more complex as the household unit grows. A plurality of various claims on any given animal is a conspicuous trait which must be considered in any discussion of management behavior. Husbandry rights, exchange rights, use rights, inheritance rights, and the right to offspring are separate and distinct and are often vested in different persons. Figure 3 summarizes some of these rights of ownership.

These multiple ownership rights are symbolized by the fact that animals carry a double brand; one being that of the individual male head of household, the other being that of the clan. This symbolizes the responsibility a man bears to steward his herds in the interest of the clan. He is managing a portion of the property of the clan to which every new male clan member has certain rights of succession.

This complex of property relationships helps to assure the right to the necessary resources for survival to individual family members. Their subsistence in general is secured by rights, not merely by the benevolence of others.

Economies of scale in defense against predators and in the management of herds, and the need to secure the viability of the household through its life cycle, encourage households to join together into a residential and cooperative unit. Normally two to five households share a boma. The boma is a compound surrounded by thick thornbush fencing within which houses are built and stock is kept at night or while young.

FIGURE 1

OWNERSHIP AND MANAGERIAL RIGHTS IN ANIMALS

HUSBAND	His individually owned animals in the family herd and in stock-friends herds. Husbandry rights in wife's and children's animals. Eventually also mother's and those of uncircumcised brothers and unmarried sisters.
STOCK-FRIENDS	The caretaker has no right to dispose of animals or their off-spring which are being herded for stock-friends.
DEBTS	Animals promised to friends. Can be claimed by "creditor" at any time. Give milk and offspring as long as they stay in the herd.
CREDITS	Animals promised by friends. Can be drawn into the family herd at will. These animals are never lost since it is a matter of a general promise and not specific animals.
WIFE	Each wife in her prime, married to a man with an average herd will normally care for and milk animals of the following categories: 1. Her individually owned animals and their offspring. 2. The animals allotted to her by her husband and their offspring. (These animals constitute her inheritance in case her husband dies. She has limited right to give away these animals). 3. Specific non-allotted animals belonging to her husband. 4. Animals belonging to unmarried sons and daughters, husband's brothers and sisters. 5. Specific animals belonging to husband's stock-friends. The husband can draw on animals of category 1), 2), 3), and 4) for any managerial purpose. She has the right to the milk from these animals and to the skin or the monetary value of the skin if any animal from category 1), 2), 3), 4), and 5) is slaughtered or marketed.
SON UNCIRCUMCISED	A few individually owned animals. Husbandry rights by father.
SON CIRCUMCISED	Increasing number of animals. Building up herd and independence of father. Right to establish stock-friendship and gradually also to market own animals independently.
SON MARRIED	Ownership and rights in animals as specified for his father. Claiming full and autonomous husband status.
SON'S WIFE	Ownership and rights in animals as specified for her mother-in-law.
SON'S SMALL CHILDREN	A few individually owned animals. Husbandry rights by father.
DAUGHTERS	A few individually owned animals. Husbandry rights by father. Decision about transfer of her animals as marriage taken by father.
HUSBAND'S WIDOWED MOTHER	Ownership and rights in animals as specified for husband's wife category 1) & 2).
HUSBAND'S UNMARRIED SISTERS AND UNCIRCUM- CISED BROTHERS	Ownership and rights in animals as specified for husband's unmarried sons and daughters.

(adapted from Billie, Eidheim, &amp; Wilson p. 23b)



Membership in a boma may result from family ties, the dependent relationship of non stock owning households upon wealthier households in exchange for labor, or on a purely voluntary basis. Ties of kinship may or may not exist and a household may live in many different bomas with a variety of other households during its life cycle.

Since disaster may strike a family unit at any time wiping out all or most of its herd, the institution of boma partnership is an especially adaptive one, providing an assurance of sustenance if not independence. Herdlessness is expected to be temporary since the household's herd is to be gradually rebuilt through gifts. There are times, though, when a household seems to become trapped in a herdless state. Sons of such families often leave pastoralism, attempting to earn a livelihood in other ways.

One relationship which is particularly well adapted to the unpredictability of weather, the risks of disease, and theft, is that of stock friendships. A stock friendship is established through the binding promise of an animal. The promise is general, referring to a class of animal rather than an individual creature, and may be collected upon at any time. Prior to being collected upon, the animal remains in the herd of the giver who retains use rights as well as the ownership of any offspring for as long as he husbands the animal. Each herd then will be comprised of the animals belonging to family members plus a number of debts and credits. Debts will consist of animals still being held even though committed to stock friends. Credits are animals belonging to the herd by virtue of stock gifts but being held with the giver's herd. Such a system distributes the household's assets in a number of localities thus substantially reducing the risk of losing everything in a single disaster. More than merely a means to build one's status,

the giving of stock gifts is a calculated investment. Although a purely exchange relationship is not usually established, the giving of stock gifts increases one's likelihood of being given similar gifts in return. Its institutionalization throughout the society is highly adaptive, resulting in a form of what Boulding calls "serial reciprocity" (Boulding, 1973). In this complex set of indirect one way transactions, a circular pattern is formed. If A establishes a stock friendship with B through the gift of a cow, and B gives one to C and C gives one to D etc. eventually the circle is closed when someone transfers a gift of stock to A. The entire system of stock friendships, gift giving and the concept of stewardship of the clan's herd allows for the redistribution of stock to create new households, reestablish herds lost in drought and distribute risk of loss over a wider geographic area. This increases the capability of the society as a whole to deal with risk and uncertainty.

Given the expectations of reciprocity, it is not surprising that even households with very small herds should vigorously resist the concept of limits being set on herd size. If you limit the herds of wealthy households, you reduce their capacity to give gifts and thus diminish the possibility that households struck by disaster will be able to recoup their losses. In such a situation, utility functions become interdependent and opposition to stock limits is a rational expression of self interest.

The nature of property rights with respect to water and range utilization also needs to be looked at. Control of rangeland and water were originally vested in the subsection with disputes being settled by the council of elders. While the land was not privately owned, households comprising a boma did identify an Olopololi area of some 10 to 20

hectares to which the boma claimed exclusive grazing rights (Billie, Eidheim, and Wilson, 1979). Beyond that, the herd will utilize resources in a seasonal fashion moving from regular dry season to wet season range depending upon conditions that year. The importance of the cooperation of boma partners becomes especially evident during extensive droughts when various strategies of splitting or combining herds are undertaken in order to maximize the number saved. While the units of a particular boma or locality may have a fairly well established pattern of grazing rotation, during periods of drought or disease a land use reciprocity occurs. Households which have resided in one subsection may move long distances to take up either permanent or temporary residence in areas with more favorable conditions. This system is reciprocal. Residents of one locality accept the newcomers with the implicit knowledge that next time it may be they who are uprooted in search of better graze.

Natural sources of water are also considered to be common property. During the rainy season standing water is relatively abundant and the herds spread out over the range taking advantage of fresh grass. In contrast, wells are traditionally owned by individuals who have hired travelling Wamburu specialists to dig them. From one to four households may contribute to the financing and maintenance of the well. Well owners have priority rights to water and the numbers of animals that can be served by one well is fairly limited (Billie, Eidheim, and Wilson, 1979).

To some extent the digging of large public access boreholes disturbs this limit on the concentration on animals in one place. In areas where careful thought has not been given to the delicate balance of available forage and water, large areas have been denuded of grass

around public wells due to the congregation of excessive numbers of stock. It is evident that much more needs to be learned about the traditional constraints on herd size and location concentration, as well as about traditional authority and decision making structures if adaptive development efforts are to be rationally implemented.

It should be noted that livestock serve a number of economic functions.

- 1). They constitute the means for providing basic subsistence needs.
- 2). They fulfill social obligations of reciprocity thus reducing risk by distributing investments and providing for a system of social security and insurance.
- 3). They constitute a mobile form of investment with the potential for natural increase (i.e. interest) in a situation where financial institutions are non existent and fixed investments are irrational given the loss imposed by the necessity of moving during drought.
- 4). They serve as a readily liquid store of wealth which at the same time provides immediate returns.
- 5). They serve as a medium of exchange, administrative fees and market exchanges often being made in kind.
- 6). They may be marketed to obtain cash to meet consumption needs.

Any rational herdsman will expand his herds to the point of optimal management given his access to labor and water supplies and established community land use limits. Where possible, he will distribute his herd in a number of locations to minimize risk. Reciprocity and mobility will be key factors in his management strategy.

Given a growing Masai population, an increasingly restricted resource base due to cultivation and the wildlife policies, and the removal of natural constraints on herd growth through veterinary advances and large public wells, an increasing threat of overgrazing and range deterioration is to be expected. There is no logical reason why the sum of the individual profit maximizing decisions of heads of households should result in the most socially optimal allocation of resources from a conservation perspective.

At the same time, if transition to a market oriented economy is to take place, a complex social system will be required to fulfill all of the economic functions currently being served by subsistence production. This is especially true with regard to the coping mechanisms to handle variation in range conditions and to provide continuity and sustenance throughout the household's life cycle.

## V. THE STRUCTURE OF THE GROUP RANCH SOLUTION

In a serious attempt to create a viable and innovative institution to cope with the perceived problem of alienation of land base and over-grazing in Kajiado District, the newly independent Kenyan government began to implement a policy of adjudication of group ranches in 1964. As Halderman points out, there were a number of sound reasons for embarking in this direction. These included the following.

- 1) The haphazard allocation of individual ranches needed to be halted in order to protect the interests of the Masai as a whole, so that the majority would not be exploited by the indiscriminate grabbing of the best land by a few of their more "progressive" tribesmen.
- 2) The Government policy was followed of not allowing any suitable land to remain undeveloped.
- 3) It was realized that the development of Maasailand must be based on economically viable units or the entire programme would be self defeating.
- 4) Developing Maasailand as group rather than individual ranches would permit the Government the advantages of economies of scale in water development and the construction of cattle dips.
- 5) The Maasai would receive legal title to the land which would result in the traditional system of communal ownership and its inherent problems being replaced by group ownership of specific tracts of land. It was hoped that these group ranches would be the solution to the awesome problem of stock control since the legal ownership of defined units would demand greater concern for the preservation of the range resource by the members of each group ranch.

(Halderman, 1972, p. 26)

Theoretically, adjudication of tribal land was to proceed on the basis of "sociologically determined boundaries" which would encompass

the traditional wet and dry season range of a relatively stable socio-political unit referred to in some reports as "elatia" (Halderman, 1972).

Once boundaries had been set and the members of the ranch registered, then, under the Land (Group Representatives) Act (Laws of Kenya, Chapter 287) the ranch was constituted as a business enterprise and acquired title to the land. A general assembly comprising a quorum of at least 60 percent of the ranch members (defined as registered male heads of households) was required by law to approve a standard ranch constitution and to elect two bodies, the group representatives and the ranch committee.

The group representatives (consisting of not less than three nor more than ten members) are to act as the legal trustees of the ranch corporation. Through them, the corporation is able to hold property, acquire debts, sue and be sued, etc. Once elected, group representatives serve until they are removed by a decision of the general assembly or until they resign. They are empowered to "issue instructions to the committee or to any member in any case in which in their opinion, such instructions are to the best interest of the group" (Davis, 1971, p. 24). As such, they serve as a council of elders to solve disputes and generally oversee the long range functioning of the ranch. Only they, with the government's approval, are empowered to sell group ranch property.

While the group representatives are the legal trustees, the ranch committee (which may include some or all of the group representatives) acts as the executive or managerial organ of the ranch. They are elected for one year terms and are entrusted with day to day decisions regarding ranch operations. The ranch committee controls rights of grazing, tillage, and water. It may charge a fee for its services, and it formulates regulations regarding the right to use group ranch land assets.

Provisions for appeal are provided in that,

Any person who is aggrieved by a decision of the committee, or of the group representatives, or of the Registrar of Group Representatives may, and if so directed by the registrar, shall apply to a subordinate court having jurisdiction in the area to determine the question.

(Helland, 1978, p. 10)

It was intended that the transition from subsistence to modern production methods be implemented through investments in modern boreholes, cattle dips, and range rotation schemes. To obtain capital from the Agricultural Finance Corporation, the group ranch must comply with regulations regarding the preparation of development plans.

The Range Management Division and the Water Development Division are mandated to provide the group ranches with technical assistance including the delegation of representatives to the range planning teams of each of the group ranches. The task of the range planning team is to:

- 1) compile a technical inventory of natural resources and assets of the ranch,
- 2) assess the production potential of the ranch and determine its carrying capacity,
- 3) establish herd projections and culling/off take rates for a ten year period,
- 4) set stock quotas for individual ranch members,
- 5) if the carrying capacity allows, determine the number of fattening steers which may be added to the ranch herd and allocate them to individual members, also determine needs for improved breeding stock,
- 6) prepare a grazing plan,
- 7) determine technical improvement needs and prepare a budget.



The ranch development plan forms the basis upon which Agricultural Finance Corporation loans are granted, with group ranch land established as collateral.

The individual group ranch members and their collectivity, the general assembly, form the third body of the group ranch. Primary among the rights of the membership is the guarantee of residence rights and a share in the ownership of the enterprise. The right to limit the number of relatives and friends who may wish to reside with members is reserved to the ranch committee as representatives of the general assembly.

Property rights over livestock remain poorly defined. While ownership of livestock is retained by individuals or households and is not transferred to the group as a whole, the ranch committee legally has the power to control access to graze and water and to allocate stocking quotas to members. Additionally, in areas with sufficient rainfall, members have the right to cultivate small farms for personal consumption. This entails usufruct rights as well as the right to fine others for crop damage due to livestock. Unused gardens become common property once again.

The general assembly meets only rarely (except in situations where the number of members is relatively small). It is empowered to select and remove the group representatives and members of the ranch committee, to discuss and vote on general issues, and to provide feedback to the ranch committee.

Performance objectives which have been advocated by the government and in terms of which the success of the program needs to be evaluated include the following:

- 1) to provide an adequate standard of living for the rural Masai population,
- 2) to improve the distribution of income and halt the continued creation of a landless class in the district,
- 3) to maintain future productivity by conserving the range resources and maintaining herd numbers within the carrying capacity of the land,
- 4) to increase the productivity of the rangeland resources by bringing them into commercial production,
- 5) to assist in meeting the growing urban demand for beef for consumption,
- 6) to increase the district's contribution to the national economy as a whole.

It should be noted that this system of performance objectives is not necessarily internally consistent. For example, the curtailing of stock numbers in order to conserve range resources may mean a reduction in the available food supply in the short run and thus a lower standard of living for some households. Similarly, the transition to beef production will be dependent on a change in diet. This is likely to entail the consumption of more purchased foods, such as corn meal and sugar, which are less nutritious than the traditionally high protein milk diet. At the same time, the transition to commercial production may result in the concentration of wealth and resources, depending upon the manner in which grazing rights are distributed.

## VI. THE GAP BETWEEN FORMULATION AND IMPLEMENTATION

Having outlined the intended group ranch structure, it is necessary to investigate how closely implementation corresponds to intent.

While it is indicated that group ranches were to be drawn up to encompass stable social groupings of Masai, Helland (1972, p. 11) is quick to point out that identification of these "social groupings" was done by a grassland botanist rather than a social scientist. In fact, there is considerable debate as to whether the term "elatia," used to identify the structure upon which the group ranches were to have been based, ever referred to more than the households temporarily sharing one boma. Even if the group ranch boundaries had been accurately drawn to correspond to territories encompassing all those who share the same source of permanent water, such configurations were traditionally temporary and dependent upon immediate ecological conditions. They were also cross cut by clan, age set, and section loyalties.

It is reported that people were told at the time of adjudication that they could register wherever they pleased (Helland, 1972, p. 12). In addition, effective measures were not taken to insure that a household registered as a member of only one group ranch, or that persons with permanent residence in Nairobi or in one of the towns in the district be excluded from group ranch membership.

The group ranches as adjudicated and registered vary extensively in size and number of members. This results in a far from equal distribution of what was once common property, ranging in an estimated

carrying capacity of from 6.0 to 19.1 standard stock units per adult equivalent (Helland, 1972, p. 10). As previously indicated, it was the prime rangeland with best access to dry season water and graze which was adjudicated first, much of it as individual ranches.

If indeed the group ranches are to become viable commercial enterprises, it is essential that each ranch contain sufficient water and both dry and wet season graze to support its herds year round, or alternatively, that it have the capacity to obtain the necessary resources through either market or status grant transactions.

H. van Swinderden, the rangeland ecologist for the UNDP/FAO project, estimated that of the 15 group ranches first adjudicated (whose resources as a whole are recognized to be above average for Kajiado District) 6 are not ecologically viable units and 2 more are marginal (Helland, 1972, pp. 22-23). This estimate assumes that the stocking rate is maintained within the carrying capacity and does not consider the special circumstances which accompany the cyclically predictable droughts. Thus, during the dry season or years of less than average precipitation, there is substantial pressure on group ranch members to look outside of the ranch boundaries for sustenance for their herds.

Market forces could theoretically be set in motion to satisfy this demand. Grazing rights could be rented from group ranches with more favorable conditions, or feed and water could be purchased. In a largely non-monetized segment of the economy, however, with far from adequate transport and marketing infrastructure, much of the demand remains ineffective and the inputs are not available.

The competition to a market solution provided by the tradition of reciprocity must also be considered. For most Masai herd managers,

information regarding the benefits of a reciprocal social organization has been subsidized from birth. The perception of available options within the opportunity set is an important aspect of the management decision. The cost of obtaining information and learning new skills must be added to the costs of purchasing inputs through the market system, assuming them to be available. Given the reciprocity system, there is less reason for a Masai head of household to remain on the ranch of which he is a member once the benefits to be expected from moving outweigh the cost of the move. As long as the costs of mobility are low (i.e., the household owns relatively few immobile resources, there are no enforced fines or fees for grazing on others' property, there is no threat of losing ranch membership, etc.) the payoff in stock saved will continue to promote a "semi-nomadic" lifestyle.

Continued mobility has, in fact, been observed for members of many of the ranches. Cases are reported where even Masai with substantial investment in settled lifestyles have in particularly bad years found the costs of moving to be outweighed by the threat of losing their entire herd if they remain sedentary (Halderman, 1972).

The perseverance of mobility as a herd management strategy means that there may be a substantial divergence between the registered members of a group ranch and the population actually in residence. When many members are absent it becomes quite difficult to obtain a legal quorum for general assembly meetings. This factor, combined with the opportunity cost of time away from herds, and distance to be traveled (often considerable and generally on foot) can be expected to reduce the effectiveness of the general assembly except on issues for which most of the

members see a substantial payoff from attendance (or penalty for failure to attend).

It is not clear from the literature what rules have been established for arriving at general assembly decisions. The method of setting the agenda, notifying members, and coming to a decision will all impact the effectiveness of the general assembly and the nature of the actions taken or not taken.

In a case study analysis of a Masai group ranch in Meru District, Doherty (1979) illustrates the manner in which the multiplicities of personal, clan, age set, and production loyalties increased the costs of arriving at decisions in the ranch assembly and the ranch committee. The ranch composition was such that stable coalitions were extremely difficult to form. Coalitions based on age set affiliations were different than those based on clan, and were different again from those based on economic interests, i.e., size of herd, ownership of property elsewhere, membership in another group ranch, amount of time spent residing off the ranch, or the holding of paid employment. In this particular case, the high cost of decision making resulted in a consistent compromise solution of perpetuation of the status quo.

If the contractual costs to the individual of making investment decisions are not outweighed by his perceived present discounted benefits from modernization and commercialization, the individual will not support such moves. Perhaps in recognition of this difficulty, the ranch committee and the group representatives were empowered to make many of these major decisions on behalf of the membership. It was expected that the group representatives would be largely from among the traditional tribal elders and thus act as a stabilizing influence while the ranch

committee would be composed of commercially minded, progressive members. In actuality, the amount of overlap between the two bodies is so extensive that they are effectively one in many cases. By and large, the members chosen to serve this dual function are the most influential men on the ranch, generally those with large herds and the social standing concomitant with stockfriendship relationships and the meeting of social obligations requiring cattle.

It is assumed that the ranch committee will be provided with expert technical assistance by the field officers who represent the Range Management Division and the Agricultural Finance Corporation. Unfortunately, these agencies are described as understaffed, overworked, and undersupplied. Adequate ecological information to determine the amount of forage available for a given group ranch is generally not available for one year, much less as a projection of long range carrying capacity given the unpredictability of precipitation. Even when a complete analysis of ranch forage is available, actual carrying capacity will be dependent not simply upon the number of standard stock units (or biomass) on the ranch, but on the mix of stock, the location of bomas, the relationship between water and graze availability, and herd management practices. Finally, estimates of current herd size and composition are often outdated and of questionable reliability.

Even given the best of technical assistance, however, there are some very difficult decisions which face the ranch committee once development plans have been laid and loans obtained. These include the distribution of stock quotas and fattening rights, and the allocation of liability for loan repayment.

If a livestock quota is to be set and adhered to, a method of establishing the initial distribution of rights is necessary. This administrative decision must be made in light of 1) the unequal distribution of stock among the members, 2) the commitment of the culture to assure any Masai an opportunity to replace his herd and to maintain subsistence levels through the system of reciprocity, and 3) the government's concern not to create an alienated, propertyless class which will add to unemployment and urban migration problems.

The options for settling individual household stock quotas include:

- 1) dividing the carrying capacity (however calculated) among the members equally,
- 2) dividing the carrying capacity proportional to a household's current herd size,
- 3) some allocation based on a household's estimated subsistence needs,
- 4) the combination of a minimum graze allocation to each household with a supplemental allocation proportional to current herd size to distribute the remainder.

Once the initial allocation is made, it must be sufficiently dynamic to meet the needs of a growing population of members and the natural fluctuations in herd population, composition, off take, etc. Periodic reallocations could be made via the administrative process, the market process, or through a system of grants.

Economic issues of equity and efficiency are clearly relevant.

Davis summarizes the issue by saying,

If grazing rights are not allocated to the stockmen who can make the most profit with them, then neither the ranch's profits, the lending agency's security nor the growth of the national economy will be best served. On the other



hand, if a handful of individuals monopolize the grazing quota, some will feel that the interests of equity and fairness are not being served.

(Davis, 1971, p. 27)

Davis goes on to advocate the distribution of grazing rights on a competitive bid, rental basis between individuals once the initial allocation of grazing rights has been made in order that

those who can make the most money out of cattle will control the grazing and this in turn will assure the ranch of greater aggregate profits than any other allocation. . . . Rental value would be based on the market's assessment of the profitability of a grazing share and share owners would obtain earnings relative to the success of the livestock enterprise.

(Davis, 1971, p. 28)

The designing of such a competitive bid system which would retain sufficient security to encourage commercial development over an extended period of time may prove problematic. In place of the market allocation of grazing rights, institutions in the United States have largely relied upon an administrative allocation of rights. Under such an administrative allocation system the ranch committee would retain control over grazing rights for the entire ranch and issue long term permits to members to run a given number of stock on the common range.

This would be somewhat similar to the system of Taylor grazing districts in the United States where private cooperative associations have formed to consolidate private, state and federal lands into grazing districts. The association then sets range management regulations and a carrying capacity limit for the district. No animals are allowed to graze on the district unless the owner has a permit issued by the association.

Under the U.S. system permits are awarded on the basis of priority and commensurability. Priority refers to the customary previous use of

the range by a member. In the Kenyan situation it would be roughly equivalent to a measure of current herd size. Commensurability is a more complex concept. In the western United States where grazing districts are found, all ranches must have a privately owned ranch as a home base. During the winter months when stock are not grazed on the range but are fed from stored hay or purchased feed, the rancher must have access to facilities for his herd. Commensurability refers to the capacity of a rancher to support his herd year round, i.e., the size of his winter holding facilities, his capacity to produce and store hay or obtain other feed, etc. It also includes recognition of the amount of his private land which is made available as part of the common range of the grazing district.

Permits are allocated and issued for a ten year period based on past herd size and capacity to support a herd productively year round. Each permit specifies a potential range of herd size; for example, 50-75 standard stock units, 200-250 standard stock units, etc. Permit holders must pay a grazing fee for the number of head grazed each month plus a lower fee for any unused permit capacity. This encourages ranchers to relinquish part of their permit if they are unable to utilize it fully. Grazing fee revenues are used to cover the operating costs of the association. In addition, under the Taylor system special assessments may be imposed in proportion to permit size in order to pay for range improvements or the leasing or purchase of additional land.

While theoretically workable in the group ranch situation, both a competitive bid for rental of individually owned stock shares or the distribution of Taylor type grazing permits requires that those participating be integrated into the monetized economy. It is necessary that

the household be producing for sale on the market and have access to cash to either bid for and pay rental costs or pay ongoing grazing fees.

In Kajiado District, the dependence of so much of the population on subsistence production appears to be a primary constraint on the operation of a grazing control system. What the group ranch is to do with households who lose their herds and have no access to cash to pay grazing fees or to bid for stock quotas is unclear. Outside employment possibilities for employment remain almost nonexistent; therefore as the population grows the demands upon the land continue to increase.

Any system for controlled grazing will be dependent upon the capacity for member households to be integrated into the market economy as a whole. This will need to include the availability of financial institutions, improvement of marketing facilities, transition to a diet of purchased food stuffs, and availability of alternative income sources for an expanding population which already exceeds that required to make optimal commercial use of the district's grazing capacity.

While increasing monetarization of the economy can be expected in the long run, immediate attempts to set and enforce stocking limits before other social institutions are in place can be expected to have minimal success. There will be tremendous pressures upon ranch committees to allow perpetuation of the status quo, especially given the following:

- 1) Ranch committee members are generally owners of large herds and are unlikely to impose either destocking or the price of rented grazing rights on themselves.
- 2) There are tremendous information costs involved in knowing whether each household is in perfect compliance with its

grazing quota. Adequate monitoring systems have not been designed.

- 3) There are enforcement costs entailed in the confiscation of excessive animals or the levying and collection of fines. Mechanisms for enforcement have not been created and the delegation of responsibility for enforcement remains unclear.
- 4) The right of members to appeal committee decisions adds to the cost of enforcement, essentially laying the burden of proof on the committee. Again, procedures for allocating such costs have not been clearly defined and precedents have not yet been set in the courts upholding the power of ranch committees to set and allocate stock quotas.
- 5) Ranch committee members are subject to yearly re-election and to the extent to which they are able to benefit socially or economically from being on the committee, they would be unwilling to alienate their constituency.
- 6) While there may be benefits to the ranch as a corporate whole to restraining herd numbers within ranch carrying capacity, there is a clear incentive for the individual member to cheat and increase his herd size while others practice self restraint.

The situation is complicated by continued mobility and disregard for ranch boundaries. While the ranch is legally empowered to close its borders and to impose fines, use physical force, or report grass poachers to the government authorities, such practices have rarely proven effective.

In addition to information and enforcement costs, there is a considerable opportunity cost. A ranch which closes its borders to outsiders despite social or family ties, knows that it has cut itself

off from the rights of reciprocity in the event of future drought or disease problems. Until other institutions are created to replace the safety valves provided by the reciprocity system, only the best ecologically endowed ranches will be able to afford to take such a risk. Generally speaking, the individual ranches which are more commercially oriented and situated in closer proximity to markets are engaged in a different production system from that of the group ranches and are thus more capable of closing their borders. Even they, however, have engaged in stock exchanges during periods of extended drought.

The potential presence of numbers of grass poachers who have not been allocated grazing quotas makes a nonsense of enforcement for ranch members. While on paper a ranch may even be officially understocked and be authorized to supplement herds with fattening cattle, there is currently no guarantee that this is an accurate reflection of rangeland utilization.

Investment in group ranch owned infrastructure such as boreholes and cattle dips is continuing with loans secured by land title, but not as fast as once envisioned. A basic issue is the securing of loans by land title since it is evident that the government has no intention of collecting on the unpaid balance through the confiscation of group ranch property and the eviction of members even if such a policy were feasible. The ranch committee is thus delegated the responsibility of determining the proportion of the loan for which ranch members are liable and enforcing repayment. Because there is a distinction between ownership of such investments, which are essentially common property in cases where distribution of grazing quotas is ineffective, and use, which is dependent upon current herd size, disputes arise. Those with larger herds see no

reason to pay disproportionately for something they do not own and for which there is no way to capitalize on their investment. Owners of smaller herds see no reason to pay for a resource they do not use proportionally. When members feel that they will have to bear an unfair share of the burden of developments, they may vote against investment and pressure ranch committee members to do likewise. Transition into the monetized economy is thus inhibited.

No matter what method of apportionment is decided upon, collection is difficult and adds costs to be considered by the ranch committee when comparing the marginal costs and benefits of the investment.

To summarize, the nature of the subsistence production system, the constraint of ecological uncertainty, the structure of costs and benefits involved in the process of enforcement of group control over individual herd management behavior, and the traditional dichotomy between land and water as common property resources and household ownership and decision making with respect to livestock all promote the continuation of traditional practices on many of the group ranches. If the transition to commercial production and stock controls is to take place, it will be dependent upon a strong, capable ranch committee, effective communication between the ranch committee and the group membership, the capacity to enforce joint decisions effectively, and ready access to the market economy. None of these preconditions are automatically provided by the structure of the group ranches as they are currently constituted.

## VII. THE ROLE OF WILDLIFE IN THE ECONOMY OF KAJIADO DISTRICT

It is estimated that at the time of the arrival of the Europeans to Kenya, 80 percent of Kenya's land area was occupied by herds of wild ungulates and other major wildlife species. During Kenya's early years as a crown colony, wild animals were viewed as a danger and an economic nuisance and bounties were set to encourage reductions in their numbers. Even with the laws which have since been implemented to conserve wildlife species, dramatic changes have taken place. It is estimated that large mammals now number less than 5 percent of their 1905 population. Change has come not as a result of hunting alone, but rather as a consequence of altered land use patterns, cultivation, destruction of habitat, fencing, etc. (Thresher, 1977).

It is in the pastoral areas of Kenya that fairly large numbers of wild mammals still abound, largely because of the pastoralist tradition of coexistence with wildlife. Subsistence pastoralist production does not bring about the rapid destruction of habitat that is created by settled agriculture or urban sprawl. While domestic herds are threatened by predators and by malignant catarrh which is carried by buffalo, pastoralists have not had the means with which to control or eliminate either the lion or the buffalo populations. The majority of the national parks in Kenya are located in the semiarid rangeland areas.

Most of the initial pressure for legal means to control wildlife exploitation came from conservationist interests, largely from the international community. In response to such pressures, the newly formed

Kenyan government took a clearly conservationist stand in 1963 when President Kenyatta, addressing the IUCN meeting in Nairobi said, "The Government of Kenya fully realizing the value of its natural resources pledges itself to conserve them for posterity with all the means at its power" (Western, 1969, p. 2).

Thus, D.M. Mbuvi, assistant director of extension for the Ministry of Tourism and Wildlife, could say,

The main objective of wildlife policy in the past was to preserve as many animals as possible, and the main instruments of policy were departments organized to police and enforce a battery of prohibitions and controls over legal and illegal activities regarding wild animals . . . 'preservation wherever possible' was the only rational policy, and this has had the great benefit of ensuring that Kenya now possesses a wildlife resource worth managing (Mbuvi, 1978, p. 3).

Few developing countries, however, can long afford to subsidize an effort which is seen as purely conservationist in approach. Increasingly, the revenue generating potential of wildlife has been recognized and in 1975 the Kenyan government issued the first statement anywhere placing wildlife in the national economic perspective as a renewable natural resource (Thresher, 1977). The national interest in wildlife as a potentially income generating resource made room for the economist as a full partner in the interdisciplinary effort of land use planning with regard to wildlife habitat. The conflicting demands for land as a result of economic and population pressures increases the urgency of the issue. The task was defined as the "efficient utilization (measured in ecological and economic terms) and conservation of natural resources" (Western, 1969, p. 2).

Given such an objective function, the following were identified as potential economic uses of wildlife: cropping for local consumption,



cropping for commercial purposes, hunting, game ranching, live capture for sale, and tourist viewing (in addition to the potential aesthetic, recreational, or scientific benefits from wildlife preservation). From a national income perspective, tourism is by far the largest income producer, and government policy has been primarily aimed at enhancing and protecting this particular form of wildlife utilization.

While commercial hunting was once the second largest income earning activity for Kajiado District, the establishment of offtake rates which were not based on actual reproductive capacity, combined with inadequate enforcement and a thriving black market in trophies resulted in excessive offtake. This became a threat to sustained wildlife populations and to the tourism industry. Therefore, in May of 1977, a complete ban on hunting was declared, followed by an announcement in December that trading in trophies and all other wildlife products was also banned. Cropping and game ranching, while carried out experimentally, have never been conducted as viable economic enterprises on an ongoing basis.

In the face of Kenya's continuing trade deficits (an estimated K£195 million in 1979) tourism is important as one of the nation's fastest growing foreign exchange earners. It is estimated that the tourist industry earned K£ 60 million in 1979, and that the wildlife drawing card contributed substantially to the industry's overall performance (Weekly Review, Feb. 22, 1980, p. 27). While there is considerable debate about the net contribution of tourism to the national income accounts and its impact on local incomes, the fact remains that it is viewed by the national government as a top priority investment.

This factor is decisive in determining the national policy directions as indicated in the draft of proposals for the 1979-1983 Development Plan

from the Tourism and Wildlife Sector Planning Group which states,

The main objective of tourism and wildlife development is to maximize net returns, subject to important constraints . . . . Greater emphasis than hitherto will be placed on a more effective integration of wildlife development and management policies with the objective of tourism development. Wildlife based tourism is a key component of the sector's activities and yields significant and increasing economic returns. Thus any policy initiatives regarding wildlife utilization will be assessed to a significant extent in terms of their expected contribution to the future well-being of tourism development.  
(Tourism and Wildlife Sector Planning Group, 1979, pp. 1-2)

Kajiado District plays a central role within this framework. As the closest and most easily accessible of the game parks, Nairobi National Park and Amboseli are major tourist attractions. Game park tourism complements the average tourist's stay at one of the beach hotels on the coast and gives Kenyan tourism a degree of comparative advantage over other beach resort locations. Von der Goetz (1977) estimates that two-thirds of all non-resident visitors to Kenya make a tour to the Amboseli National Park. Thresher (1973) indicates that of the 120.9 million shillings of government tourist receipts in 1972, 22 percent were directly due to Kajiado District.

As Von der Goetz explains, "The closeness of Kajiado District to the country's capital, the multitude and diversity of its wildlife, and scenic attractions due to the vicinity of the Kilimanjaro and the favorable infrastructural conditions make the area particularly suited for tourists" (Von der Goetz, 1977, p. 18).

Although aerial surveys have indicated that wild herbivores comprise at most 21 percent of the district's herbivore biomass (Davis, 1972), the tourism industry is the largest income earner in Kajiado District. Substantial scope for conflict of interest exists, therefore, by virtue of the distribution of tourist generated income and decision making

authority. Mitchell (1970) estimates the breakdown of net tourism revenues as follows: 2/3 to government, 1/5 to labor as higher wages than otherwise, and 1/7 to investors (including government investments).

While exact figures relating to amount of tourism generated employment and receipts from sales of souvenirs, etc. do not exist for Kajiado District, it is clear that the primary beneficiaries of the tourism industry are the national and district governments, a few entrepreneurs (generally expatriate or at least non-Kajiado residents) and those employed in service industries in Nairobi and on the coast. It is expected that the proportion of tourist generated revenues to remain in Kajiado District is low and even less goes into the pockets of the traditional pastoralist Masai. Studies of the economics of Kenyan tourism are particularly weak in their analysis of the distributional impacts of tourist investment.

The behavior and production techniques of the Masai, however, are crucial to the economic viability of the tourism industry because of tourism's dependence upon a relatively pristine environment and a multiplicity of wildlife. The wildlife populations of both Nairobi National Park and Amboseli spend only a small percentage of the year within the actual park boundaries. The wet season migration region for the district's major herds of large mammals covers a dispersal area of about 2,000 square kilometers of rangeland surrounding each of the national parks (Western, 1969). Thus a situation is created in which pastoralists are expected to coexist peacefully with wildlife on Masai owned range during the rains, while the dry season areas of concentration formerly used by wildlife and domestic herds alike are now reserved exclusively for wildlife. Masai subsistence behavior acts as a constraint on the

government's objective of maximizing the efficient utilization of wildlife, for as Thresher points out,

Net returns from wildlife activities cannot be determined from analysis which ignores that wildlife and livestock occupy Kajiado together. . . . Unless livestock animals are controlled, while they exist as competitors for ecological positions occupied by wildlife, national schemes for calculating the potential wildlife (income) cannot be developed. . . . Hence wildlife plans which ignore livestock dynamics are constricted by assumptions which are simply invalid. (Thresher, 1975, pp. 2-3)

Traditional Masai production methods are described by government documents as "completely inimical to sustained wildlife utilization" (Mbuvi, 1978, p. 2).

On the basis of this interdependency, the economists working with the FAO Wildlife Management Project have stressed the need to integrate wildlife generated income into the district's economy and especially to increase the value of wildlife to the ranch owners whose land directly bounds the national parks. From an economic perspective, the rational profit maximizing rancher would be expected to equate the marginal benefit of wildlife utilization on his land with its marginal cost in terms of crop damage, predation losses, or reduced availability of graze to domestic herds.

Using such an analysis, Davis (1972) attempted to calculate the break-even return from wildlife at which point a rancher would be indifferent between keeping wildlife or replacing them with cattle. He assumes different opportunity costs of capital and different rates of substitution of cattle for wildlife. His assumptions about the infrastructural costs of the replacement, however, are not given. Finally, he states as a given that the potential externalities between exploitation of game herds on private land and tourism of game parks have been dealt

with and the institutional and market structures and the technical expertise to allow for increased agricultural exploitation of game meat, hides, and hunting will be available. Based on such assumptions, his conclusion is that even under the most favorable conditions for cattle, the returns from wildlife need be only about \$.06 per acre to justify a joint wildlife/livestock operation.

While this type of marginal analysis may be theoretically correct, the contention here is that institutional and social constraints impose very real cost considerations which must be taken into account in predicting the performance outcomes of land use management policy. The behavior of individual members of a group ranch is interactive, and is therefore different than the simple sum of the choices made by a number of Davis' profit maximizing ranchers.

At the present time, substantial constraints impede the progress toward agricultural exploitation of game products by group ranches. The hunting ban imposed in 1977 eliminated the primary source of income to group ranches from wildlife. Prior to the ban, the ranches benefited to some degree from the government revenues from hunting licenses and fees. Hunters were required to register to hunt within a specified wildlife management unit comprised of one or more group ranches. A portion of all fees collected would be dispersed to the ranches who comprise that wildlife management unit. In addition, it was possible for a ranch to grant monopoly hunting privileges to a particular professional hunting organization by contract. The ranch would be paid an agreed upon fee by the hunting organization which then would handle all bookings for that unit for the duration of the contract.

A number of factors contributed to the instability of the situation, however. Because leases were contracted for only one or two years there was no incentive for the professional hunter to ensure the long term sustained yield of the wildlife populations on a particular ranch. The hunting quotas were arbitrarily set by the game department with more of an eye to government revenue than to scientific animal population dynamics. Finally, such quotas as were set were not adequately enforced. Thus, considerable poaching took place in response to the demand for trophies, ivory, etc. These factors eventually contributed to excessive offtake and resulted in the hunting ban and the halt to trade in animal products.

While game ranching and cropping are theoretically possible, they require considerable managerial skill and technical information. Substantial capital investment may be required to conduct them on the most efficient scale for provision of a sustained yield. The ban on trade in wild animal products has effectively eliminated any potential marketing of meat and hides for the time being at least.

In light of such socio-political constraints, the FAO Wildlife Management Project placed particular stress on the importance of providing group ranches in the main dispersion areas with an economic interest in the preservation of the major wildlife herds and proposed that a system of wildlife utilization fees be implemented.

## VIII. THE STRUCTURE OF THE PROPOSED WILDLIFE UTILIZATION FEES

Sweeping powers to implement a system of protection areas and grazing fees where deemed appropriate to assure the ongoing support of wildlife on group ranch land were granted to the Minister of Tourism and Wildlife by the Wildlife Conservation and Management Act of 1976. The rationale for such a policy was explained in the 1975 Statement on Future Wildlife Management Policy in Kenya as follows:

The provision for negotiation and declaration of Protection Areas are the most important innovation in the new legislation. Protection Areas are absolutely critical for the continued survival of the Wildlife herds which attract visitors ... In most of these areas, the animals migrate over much larger areas than are included within the Park/Reserve, and it would be both infeasible and undesirable to extend the boundaries of the Park/Reserve to cover the whole ecosystem. While landowners in some migration areas may be able to secure direct returns from wildlife, it is likely that in a majority of the cases such returns will not be sufficient to induce them to maintain the large wild herds necessary for survival of the attractiveness of the Park/Reserve, and hence for the expansion of tourism in this country. There must therefore be provision for payments of some returns from tourism within the Park/Reserve to these landowners.

(Republic of Kenya, 1974, p. 13)

Two primary constraints on the implementation of a system of wildlife utilization fees were recognized. It was necessary that pastoralists have the legal basis for rational land use planning and that the technical know-how to establish the level of compensation due to ranchers be available. Government took the position that the process of land adjudication had satisfied the first requirement. The 1975 Statment on Future Wildlife Management Policy in Kenya declared that:

Recent and continuing changes in land ownership and the scale and nature of range development, both require and permit a more activist approach to wildlife management. The pastoral areas are being adjudicated into group and individual ranches held on freehold, for the first time giving pastoralists the legal basis for intensive management of the land as contrasted with individual herds of livestock. In addition, pastoralists are now in receipt of large-scale technical and financial assistance, from Kenyan and overseas sources to permit and induce them to improve their management practices, and specifically to raise substantially domestic stock off-takes. Adoption of these practices will reduce herds of domestic stock relative to carrying capacity ... (T)he shift to commercially motivated range management, including rational control of livestock numbers on the land, provides a necessary condition, missing in the past for the sustained utilization of wild animals.

(Republic of Kenya, 1974, p.2-3)

The technical task of designing a means by which appropriate compensation could be assessed was turned over to the FAO Wildlife Management Project. A proposal was developed to initiate a system of Wildlife Utilization Fees (WUF) for Nairobi and Amboseli National Parks on an experimental basis. The proposed WUF were seen as situation specific to handle problems of land use competition in these areas where the wildlife dynamics were reasonably well understood. They were not intended for immediate implementation in all national parks.

The designated purpose was to reward ranchers who controlled large tracts of land in the dispersal areas for permitting wild herbivores free access to graze and thereby to encourage support for animal populations that are of particular importance to the national economy. The computation is to include consideration of 1) losses of income from livestock on the assumption that if wildlife were not allowed to graze, the carrying capacity of the land could support



more livestock, 2) costs of predation or transmission of disease to livestock, and 3) a financial inducement to maintain wildlife populations.

The calculation of fees suitable to cover factors one and three above are based upon the distribution of wildebeest and zebra herds since the seasonal migration of these herds constitutes about two-fifths of the wildlife biomass in the district and has the largest impact on localized grass resources and the perceived costs of landowners. To qualify for WUF payments it is proposed that a ranch must have supported a minimum of 25,000 kilogram per annum biomass of these species as determined by aerial and ground monitoring. These figures will be calculated on a quarterly three year moving average basis to allow for seasonal and ecological variations which are not a function of a rancher's willingness to support wildlife or his range management behavior. Thus a ranch would get some WUF even in years when wild herbivores did not use its land because of poor range conditions outside the rancher's control such as during a drought.

The payments would be administered by a wildlife committee to which each ranch would appoint a minimum of 1 and a maximum of three members. Each ranch is to be allocated WUF in proportion to the amount of domestic stock theoretically displaced by the average biomass of wild herbivore supported on its land for a particular period of time. It is proposed that this initial allocation be adjusted by additional criteria in order to encourage certain land use practices. Adjustments include:

- 1) a 25 percent reduction for each special permit requested in order to kill a wild animal with the further reduction of the marketable value of any trophies, skins, and meat thus obtained,
- 2) a 25 percent reduction for any natural water point fenced off,
- 3) a 2.5 percent reduction for each reported incident of harassment of wild animals within 1 kilometer of a natural water source,
- 4) up to 5 percent increase for allowing wild species access to man-made water points,
- 5) a 65 percent reduction for perimeter fencing unless it is of the Laikipia type which allows wild animals relatively easy passage, in which case it is only a 20 percent reduction,
- 6) an increase of 10 percent where there is no fencing at all,
- 7) a 5 percent reduction for each incident of poaching not first reported by the ranch (no penalty if first reported by the ranch) unless committed by a member or part of his extended family in which case it is a 50 percent reduction for the first incident and a 100 percent reduction if there are two incidents in one year,
- 8) a percentage reduction in WUF equal to twice the proportion of ranch land under cultivation. No ranch can qualify for WUF if it applies for compensation for loss due to crop damage from wild herbivores.
- 9) After the third year a ranch owner (or the chair and secretary/ treasurer of a group ranch) must sign a written agreement not to harass or disturb wildlife except as necessary within 1 kilometer of human habitation. Subsequent to that the committee is authorized to deduct up to 25 percent per incident,

- 10) an increase of 25 percent for abiding by any written stocking quota agreements entered into with the government or the Agricultural Finance Corporation, plus a 2.5 percent increase in WUF for every 5 percent or part thereof that actual stocking level is below that agreed upon (actual stocking level being defined as the highest level reached in the previous 18 months).

In addition, losses due to predation or disease which are substantiated by a qualified government officer or veterinarian shall be compensated at full value of the live domestic animal thus lost.

The intent is clearly to establish a system of rewards and fines in order to change the perceived costs and benefits to the rancher of such practices as fencing, poaching, cultivation, harassment and stocking level, and thereby to alter his behavior.

WUF payments are to be directly deposited on a quarterly basis into the savings account of the ranch. If there is no savings account, there will be no WUF payment. The group ranches receiving payment are mandated to distribute not less than one-third of the annual WUF payment in equal cash allotments to all heads of families registered for that group ranch.

## IX. THE EXPECTED IMPACT OF WILDLIFE UTILIZATION FEES

In evaluating the potential performance impacts of this proposal, a central issue will be the difference in impact between those who own individual ranches and those who are members of group ranches.

Those who own individual ranches have been fairly well integrated into commercial beef production. The individual ranches have a higher proportion of available dry season graze than do the group ranches in general. They were adjudicated first, and thus have been in operation for a longer period of time. They tend to have a higher level of managerial skill at their disposal. Most of the individual ranches are located in the northern part of the district just outside of Nairobi, close to the private abattoirs and the Kenya Meat Commission Headquarters. It is primarily these ranches which will lie in the dispersal area for Nairobi National Park and thus qualify for WUF for that area.

It is rational to expect the managers of individual ranches to act in a profit maximizing fashion. Management behavior will depend upon the relationship between costs and benefits of a given action. The amount of money to be distributed as WUF will be a critical factor. If the payments are indeed sufficient such that a 65 percent reduction in WUF as a penalty for installing a perimeter fence exceeds the value of the fence to the rancher, the rancher can be expected to refrain from erecting the fence. A similar cost comparison can be conducted for each of the different adjustments to WUF. If the administrators of WUF are indeed serious about taking an experimental approach to policy

formation, it may be possible to make marginal adjustments in the percentage of the rewards or penalties in order to achieve the desired behavior.

While the concept has promise, difficulties remain to be worked out. The accuracy of the information available to the committee for purposes of setting WUF levels is crucial. Several of the adjustments proposed are virtually impossible to enforce. For example, it can be expected that the definition of "harassment" will prove problematic. With few people around to monitor behavior in such a sparsely populated area, those factors which can be physically observed such as kilometers of fence, hectares of cultivation, and open availability of water, have a much higher probability of being affected by the regulations.

The ease and speed of the bureaucratic process for obtaining compensation for predatory or disease loss will also have an impact. A rancher is going to consider the value of the time and effort required to obtain compensation when evaluating how much risk he is willing to take. The lower the contractual costs in obtaining compensation, the more truly indifferent the rancher will be between whether he markets the cow or loses it to a lion. The more difficult the process, the less willing the rancher will be to allow predators the range of his property.

Finally, the regulations with respect to cultivation are likely to affect individual ranches situated close to areas where agriculture is viable and which may be engaged in renting out land for cultivation. If crop damage occurred on a ranch which contained both rangeland and cultivation, the owner would have to weigh the comparative advantages of filing for crop damage compensation (which is reputed to be difficult to obtain) or settling for his WUF, reduced as it was by the proportion of his land which was in cultivation. Whether this would be successful

in discouraging the further expansion of cultivation will depend on the relative values involved and the capacity of aerial survey techniques to accurately determine the area under cultivation.

Complications will arise when the boundaries of an individual ranch are not respected by other pastoralists. The extent to which this will be a problem is unclear since it is reported that few traditional pastoralists trespass on the property of individual ranches (Helland, 1978).

The situation is very different for the group ranches. The group ranches around Amboseli were among the very last areas to be adjudicated. They are large in area, less developed than some of the earlier ranches, and quite inaccessible. Livestock production serves largely a subsistence function. What marketing is done is generally conducted with Masai traders who go around to the bomas collecting animals and then trek them to the abattoirs or to an organized sale in Namanga. There are no banks in the vicinity. The nearest one is in Kajiado which is from 50 to 150 kilometers away depending upon which group ranch one lives on.

The policy of requiring a savings account may be designed to encourage savings and investment, but it imposes substantial costs upon the group ranches.

Once the WUF is determined, at least one third of it is to be divided equally among the group ranch members. Unless the initial allocation is very large, the actual amount distributed to a household will not be very substantial.

While a breakdown of the number of members per group ranch in the dispersal area is not available, it is estimated that there are 1,600 households in the Masai Amboseli unit of the district (Kajiado District Development Plan, 1975). If, as a hypothetical example, it

were assumed that half of the households in Masai Amboseli were actually registered members of eligible group ranches, and if all of the 1972 profits from Amboseli tourist gate fees were allocated as WUF, this would result in an annual distribution of \$35 per household. Clearly, there is no intention of distributing all gate profits, since most of the revenue thus generated goes to finance district infrastructural investments.

Thus, if each individual member balances his own small part of the WUF dispersement against the benefits of poaching, for example, there may be substantial incentive not to comply with the behavior WUF seeks to encourage. Depending upon the likelihood of detection, the individual's behavior may cost the entire ranch far more than that person gains from it. The disparity between the costs and benefits of the individual versus the group is not dealt with in the WUF proposal. In order for the group ranch to benefit from its WUF allocation, there will need to be a means of controlling the behavior of individual members with regard to poaching, access to water, harassment, and stocking level. Much will depend upon the extent to which regulation is accepted as legitimate, the person in violation can be identified and is blamed for the loss sustained by the group as a whole, and effective social pressure is brought to bear upon him.

In contrast, decisions with regard to fixed investments such as fences and cultivation are far more likely to be made at the ranch committee level and can thus be calculated equating enterprise level costs and benefits. WUF incentives might play a role in these issues. However, it should be noted that fences and cultivation are unlikely investments for these group ranches at the present time. Thus the

crucial issues of stocking level, poaching, harassment, and access to water are the very ones upon which WUF can be expected to have little or no impact.

If WUF payments to the ranches are substantial, they may be used to subsidize the cost of enforcement of stocking quotas. However, if enforcement remains ineffective, WUF payments are unlikely to have much impact upon the individual decisions of ranch members.

In summary, while it is clearly important, from a conservationist perspective and in order to maximize tourism revenues, that ranchers in the dispersal areas benefit from wildlife and thus have an incentive to alter their livestock management behavior, WUF does not appear likely to achieve the desired outcome. The individual ranch owners with whom the WUF incentives might be effective are more likely to be following a rotational grazing pattern and controlling their stock numbers already. Second, they are the ones most likely to have access to capital in order to invest in tourist services in some manner. The government has indicated that WUF payments will be halted for ranches earning a regular income from tourism related sources.

It is precisely the group ranchers who persist in subsistence production and with whom overstocking may be a problem. On the group ranches, however, the number of persons involved and the disparity between private and group interests reduces the potential effectiveness of the scheme. Diseconomies of scale, contract costs in decision making, and insufficient access to capital handicap the possibility of alternative tourism income for these group ranchers and the hunting ban has effectively eliminated any other wildlife generated revenues.



## X. SUMMARY AND CONCLUSIONS

The potential for overstocking and degradation of rangeland resources in Kajiado District has the earmarks of what has been called the "social trap." The term social trap refers to the situation in which a group of people with a common goal make individual decisions which result in the confounding of their joint objective. As Schmid explains:

(T)here is some act under the individual's control that promises to produce some welfare improvement for that individual. The alternative line of action that would be consistent with the more preferred long-run result is marked by the fact that no matter how hard the individual tries, alone he can produce no net benefit or fewer than in the dominant activity. Higher net payoff from the mutually desired product cannot be achieved by any change under the unilateral control of an individual.

(Schmid, 1978, pp. 166-167)

In the Masai production system, the entire group as well as individual families would benefit from the improvement of rangeland grazing resources which would be possible through controlled grazing schemes and proper rangeland management the key to which lies in controlling stock numbers to balance changing resource availability. For the individual herd manager, however, the reduction of his own herd will have no impact upon the quality of range resources unless all other persons sharing the use of that range behave likewise. There are thus three options: either the system continues as is with individuals building up herd size beyond the land's carrying capacity, a viable process for

group decision making and enforcement is constructed, or an outside authority is somehow imposed to control stocking and management behavior.

This situation is further complicated by three fundamental constraints. To begin with, the extreme variability of precipitation necessitates a risk averse herd management policy on the part of each household. In order to be ecologically viable, the land resources available to any livestock production operation must include both dry and wet season graze. This means that for most of Kajiado District the economic scale of production covers a large land area per ranch. During times of exceptional drought even large ranches may not provide sufficient graze and mobility of herds will be necessary.

In contrast to the economies of scale in land utilization, there exist considerable diseconomies of scale in decision making. Problems arise when large numbers of persons must agree on investment decisions, stocking levels, and herd management strategies. Not only is reaching agreement a costly effort, but implementation and enforcement becomes problematic. High exclusion costs may make a mockery of attempts to improve rangeland resources.

Third, the issue is complicated by the need to consider the distributional impact of any policy proposals. Seventy thousand Masai reside in the district and the number is growing. Subsistence production is currently providing them with sustenance along with a modicum of flexibility, security and independence. Greater efficiency in production which results in social dislocation and the creation of a landless class is unlikely to be seen as progress, especially in a nation as poor as Kenya where the bureaucratic capacity and financial resources to redistribute gains through a welfare system are unlikely to exist.

While adjudication of the entire district into huge individual ranches might resolve the disequilibrium between economies of scale in land size and the diseconomies of scale in decision making, it is not going to meet the needs of the local population.

Policy makers are now constrained to operate within the property rights which have been vested in the group ranches. Working within this institution, the task facing those concerned with overstocking is complex, persistent and not subject to simple solutions. Potential for improvement may lie in the effort to reduce decision making and enforcement costs, and to improve production technology to increase the payoff to the individual. To do so will require the gathering of substantially more detailed information on production and decision making by researchers who are cognizant of ecological constraints and the cultural adaptations they have given rise to, and who are capable of working closely with local people in designing decision making processes and production strategies that meet the objective function of the household unit.

The accomplishment of such a task will require the inflow of a substantial subsidy of national funds since clearly no individual household or group ranch has access to the necessary expertise or the funds to hire it. Whether such a request for large sums of precious research and development funds from the national treasury can be justified is a serious question, especially given the complex nature of the problem, the fact that many solutions may need to be situation specific, and that success is far from assured and may provide only marginal improvements in productivity over a delayed payoff period.

The issue of control of herd size is just the tip of the iceberg, however. If one is to control herd size, the issue of finding alternative

means to fulfill the purposes that livestock serve has to be dealt with. In short, the transition from a status grant type of economy to one based on administrative and market transactions is taking place and this is a process about which little is understood.

As previously noted, livestock serve numerous social and economic functions including: provision of sustenance, functioning as a mobile form of investment, acting as a liquid store of wealth, and serving as a medium of exchange. At the present time the institutional structures to replace these functions do not exist. Even more fundamental, perhaps, may be the functions of social cohesion and risk aversion which are provided by the reciprocity system and therefore dependent at this point upon livestock. Sustenance for the elderly, the young, and those whose herds are struck by disasters is organized through the system of reciprocity. The distribution of wealth to allow for the establishment of viable new households takes place through the system of grants and reciprocity. The diversification of one's investments takes place through stock friendships. While far from perfect, this socio-economic structure has evolved to serve vital needs of the community.

The impact of the transition to a monetized economy on the continued functioning of such social systems of reciprocity is an important issue. In industrialized societies, market or administrative transactions have taken over the functions once held by grants transactions. This transition has necessitated the creation of a huge bureaucratic institution to provide welfare, social security, unemployment compensation, education, health benefits, etc. In addition there has been a proliferation of private enterprise solutions such as insurance. Even given the large sums of money that richer industrialized societies have been able to

spend on such services, the provision of social services is continually being criticized for its inefficiency, its lack of warmth and caring, its inability to deal with issues on a situation by situation basis, etc.

Given the constricted resources in money, personnel, and expertise of most developing countries, even the inadequate structures possible in industrialized societies are not attainable. Clearly before creating institutions which will contribute to the demise of the status grant and reciprocity system, thought must be given to its alternatives.

Many societies are facing this transition from traditional, subsistence production, grant oriented economies into a market oriented world. Likewise, the problems of the common range are being confronted in a number of different geographic and social settings. It is the opinion of the author that considerable insight could be obtained from the extension of the situation, structure, performance perspective to the comparative analysis of grazing systems. Of particular importance will be the structural analysis of grazing societies which have made the transition to market production.

In the United States and in various European countries institutions such as the Taylor grazing districts have been devised which were appropriate to the socio-ecological situation and which have succeeded in solving many of the problems of overgrazing. The analysis of such systems must extend beyond their current structure to look at the situational preconditions which allowed them to evolve and to be effective. A more detailed understanding of the process of institutional evolution in response to changes in the social and historical context is needed as is an understanding of the costs and mistakes along the way. Social structures cannot be exported wholesale as final products, but

greater insight into their evolution and their socio-economic context will help to fill the gaps in the current understanding of the social transition of grazing societies.

Kajiado District has the potential to meet the needs of its own population, to produce livestock products to meet the demand of the nation's growing urban population, and to draw in foreign exchange and contribute to increased employment and investment possibilities through a growing tourist industry. For such potential to be realized, however, the difficult task of controlling livestock numbers and preserving the districts range and wildlife resources must be accomplished. If policy makers and advisors understand the functioning of the group ranch social structure and production system, the interpersonal dynamics that direct the decision making process, and the preconditions which have allowed other societies to weather the transition to commercial production, they will be better equipped to facilitate the development of effective local institutions designed to meet local needs.

There are no guarantees. Change will happen but whether such change can be accomplished in a manner which meets the needs of the local population, results in a minimum of social dislocation, and preserves the resource base for future generations remains to be seen.

## BIBLIOGRAPHY

- Billie, Jean Claude, Harald Eidheim, and Trevor Wilson. 1979. "Status of the Baseline Study of Elangata Wuas and Kilonito Group Ranches." Nairobi: (mimeo).
- Boulding, Kenneth E. 1973. The Economy of Love and Fear: A Preface to Grants Economics. Belmont, California: University of Colorado, Wadsworth Publishing Company, Inc.
- Brown, L.H. 1977. "The Ecology of Man and Domestic Livestock," in D.J. Pratt and M.D. Gwynne, ed., Rangeland Management and Ecology in East Africa. Huntington, NY: Robert E. Krieger Publishing Co.
- Campbell, David J. March 1979. Development or Decline: Resources, Land Use and Population Growth in Kajiado District, Nairobi: Institute for Development Studies, University of Nairobi, Working Paper No. 352.
- July 1979. Kajiado District: A Case Study. Workshop on the Development of Kenya's Semi-Arid Areas 23-26th of July 1979. Nairobi: Institute for Development Studies, University of Nairobi.
- August 1979. Response to Drought in Maasailand: Pastoralists and Farmers of the Loitokitok Area, Kajiado District. Nairobi: Institute for Development Studies, University of Nairobi, Discussion Paper No. 267.
- 1980. "Land Use Competition at the Margins of the Rangelands: An Issue in Development Strategies for Semi-Arid Areas," forthcoming in G.B. Norcliffe and T. Rinfeld, ed., Development Planning in Kenya: Essays on Policy Issues and Project Planning.
- Clawson, Marion. 1951. Uncle Sam's Acres. New York: Dodd, Mead and Company.
- Clarke, R. and F. Mitchell. June 1968. "The Economic Value of Hunting and Outfitting in East Africa." East African Agricultural and Forestry Journal, Special Issue, Vol. XXXIII, pp. 89-97.
- 1969. Estimates of Expenditures by Clients of East African Outfitters, 1966: Some Preliminary Data. Nairobi: Institute for Development Studies, University College, Nairobi, Staff Paper No. 37.
- Dahl, Gudrun and Anders Hjort. 1976. Having Herds: Pastoral Herd Growth and Household Economy. Stockholm: Department of Social Anthropology, University of Stockholm, Stockholm Studies in Social Anthropology No. 2.

- Davis, Robert K. 1971. "Some Issues in the Evolution, Organization, and Operation of Group Ranches in Kenya." East African Journal of Rural Development, Vol. 4, No. 1, pp. 22-33.
- 1972. "The Trade-off Between Wildlife and Livestock in One Ranching Area of Kenya," East African Journal of Rural Development, Vol. 5, (1 & 2), pp. 73-80.
- Doran, M.H., A.R.C. Low, and R.L. Kemp. February 1979. "Cattle as a Store of Wealth in Swaziland: Implications for Livestock Development and Overgrazing in Eastern and Southern Africa." American Journal of Agricultural Economics, Vol. 61, No. 1.
- Doherty, Deborah. July 1979. Factors Inhibiting Economic Development on Rotian Olmakongo Group Ranch. Nairobi: Institute for Development Studies, University of Nairobi, Working Paper No. 356.
- Dyson-Hudson, Neville and Rada Dyson-Hudson. 1975. "Commentary," in J.L. Newman, ed., Drought, Famine and Population Movements in Africa. Syracuse: Syracuse University.
- Godana, Bonaya Adhi. March 1978. "Some Aspects of Livestock Development in North Eastern Province of Kenya." Paper presented for the Workshop on Popular Participation and Development, March 27-29, 1978. Westwood Park Hotel, Nairobi (mimeo).
- Goltz, Georg von der. November 1977. "Results of the Kenya Wildlife Management Project," paper presented to a Study Workshop on Priorities of Wildlife Research in Kenya, November 6-15, 1977 (mimeo).
- Halderman, John M. 1972. An Analysis of Continued Semi-Nomadism on the Kaputie Maasai Group Ranches: Sociological and Ecological Factors. Nairobi: Institute for Development Studies, University of Nairobi, Discussion Paper No. 152.
- Helland, J. March 1978. "An Anthropologist's View of Group Ranch Development." Nairobi: International Livestock Center for Africa and the Economic Development Institute of the World Bank, Livestock Development Projects Course, Course Notes No. 24.
- Henry, Wesley R. 1979. "Patterns of Tourist Use in Kenya's Amboseli National Park: Implications for Planning and Management," paper presented at the International Symposium: Tourism and the Next Decade, March 11-15, 1979 (mimeo).
- Horowitz, Michael M. December 1978. "The Sociology of Pastoralism and African Livestock Projects." Institute for Development Studies. Report submitted under contract no. AID/OTR-147-78-48 (mimeo).
- "Kajiado District Development Plan 1974/78." December 1975 (mimeo).



- Kajiado District Workshop Report on Wildlife Conservation and Management, Held at Amboseli National Park, 22-22nd June, 1977. 1977. Joint Publication of FAO/Programmes for Better Family Living, FAO/Kenya Wildlife Management Project, and Wildlife Conservation and Management Department No. 34.
- Laws of Kenya. Chapter 376. Revised Edition 1977. Nairobi: Government Printer.
- Livingston, Ian, Peter Hopcraft, and David Martin. 1975. Livestock Chapters from the Second Overall Evaluation of the Special Rural Development Programme. Nairobi: Institute for Development Studies, University of Nairobi, Occasional Paper No. 12.
- Livingston, Ian and Peter Hopcraft. January 1976. Cowboys in Africa: The Socio-Economics of Ranching. Nairobi: Institute for Development Studies, University of Nairobi, Occasional Paper No. 17.
- Livingston, Ian. January 1977. Economic Irrationality Among Pastoral Peoples in East Africa: Myth or Reality? Nairobi: Institute for Development Studies, Discussion Paper No. 245.
- Loomer, C.W. and V. Webster Johnson. 1949. Group Tenure in Administration of Public Lands. Washington, D.C.: United States Department of Agriculture, Circular No. 829.
- Loomer, C.W. and G.H. Craig. 1943. Collective Tenure on Grazing Land in Montana. Bozeman, Montana: Montana State College Agricultural Experiment Station, Bulletin No. 400.
- Mbuvi, D.M. March 1978. "Wildlife Conservation and Management in Kenya's Development." Nairobi: International Livestock Center for Africa and Economic Development Institute of the World Bank, Livestock Development Projects Course, Course Notes No. 30.
- Meadows, S.J. and J.M. White. 1979. Structure of the Herd and Determinants of Offtake Rates in Kajiado District in Kenya, 1962-1977. London: Overseas Development Institute, Agricultural Administration Unit, the Design and Management of Pastoral Development, Pastoral Network Paper 7d.
- Mitchell, Frank. June 1968. "The Economic Value of Wildlife Viewing as a Form of Land Use." East African Agricultural and Forestry Journal, Special Issue, Vol. XXXIII.
- November 1969. Forecasts of Returns to Kajiado County Council From the Masai Amboseli Game Reserve 1970-2000. Nairobi: Institute for Development Studies, University College, Nairobi, Discussion Paper No. 87.
- June 1970. "The Value of Tourism in East Africa." Eastern Africa Economic Review, Vol. 2, No. 1, pp. 1-23.

- Ouma, Joseph P.B.M. 1970. Evolution of Tourism in East Africa. Nairobi: East African Literature Bureau.
- Republic of Kenya. November 1973. Hunt Management Programme Kajiado District. Kenya Game Department and UNDP/FAO Wildlife Management Project, Project Working Document No. 3.
- Republic of Kenya. November 1974. Sessional Paper No. 3 of 1975 Statement on Future Wildlife Management Policy in Kenya. Nairobi: Government Printer.
- Schmid, A. Allan. 1978. Property, Power and Public Choice: An Inquiry into Law and Economics. New York: Praeger Publishers.
- Thresher, Philip. 1973. Some Economic Problems of Wildlife Utilization in Kajiado District. Nairobi: Institute for Development Studies, University of Nairobi, Working Paper No. 124.
- January 1975. "Economic Analysis and Wildlife Management in Kajiado District." (mimeo).
- August 1975. "Wildlife Utilization Fees (WUF) for Amboseli and Athi-Kapiti Ecosystems Only - First Draft." FAO Wildlife Management Project. (mimeo).
- December 1976. Wildlife Viewing Cost/Benefit Simulation Model. Nairobi: Wildlife Conservation and Management Department, Ministry of Tourism and Wildlife, and UNDP/FAO Wildlife Management Project, FAO Wildlife Management Project Working Document No. 14.
- January 1977. "Economic Characterization of Kenya's Wildlife: An Introductory Talk - Some Preliminary Perceptions." FAO Wildlife Management Project. (mimeo).
- July 1977. "A Conceptual Approach to the (Kenyan) Rangeland Economy." Nairobi. (mimeo).
- Tourism and Wildlife Sector Planning Group. August 1978. "Development Plan 1979-1983 Tourism and Wildlife." (mimeo).
- The Weekly Review. February 22, 1980. "Gloomy Future Facing Kenya." pp. 25-28.
- Western, David. April 1969. Land Use in Maasai Amboseli Game Reserve, a Case Study for Interdisciplinary Discussions. Nairobi: Institute for Development Studies, University College, Nairobi, Staff Paper No. 40.
- 1974. "The Environment and Ecology of Pastoralists in Arid Savannahs," paper presented at the SSRC seminar on the Future of Traditional "Primitive" Societies, Cambridge. (mimeo).

Widstrand, Carl. April 1972. "On Pokot, Group Ranches, Livestock Marketing, Pastoral Values, Planners and a Variety of Topics Vaguely Related." (mimeo).