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“Desertification and Pastoral Development in Northern Kenya”

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DESERTIFICATION AND PASTORAL DEVELOPMENT IN NORTHERN KENYA

by Daniel N. Stiles

Northern Kenya is a region that is presently experiencing environmental deterioration. It is a semi-arid and arid land made up of volcanic plateaux, dessicated lake flats, highland grasslands, lowland acacia bush and shrublands, and a few isolated mountain islands topped by receding forests. Except for the mountain areas and along some of the river valleys, little or no cultivation is practised. The region is considered to be environmentally marginal, and it is occupied by nomadic pastoralists.

Archaeological evidence from around Lake Turkana indicates that cattle and small stock first entered northern Kenya approximately 4000 years ago during a period of higher rainfall than the present (Owen et. al., 1982). Lake level and pollen studies suggest that northern Kenya was well-watered and covered by a rich carpet of vegetation up until about 3000 years ago. At this time lake levels began to fall as rainfall decreased. There has not been a steady progression of ever drier years, but rather a fluctuating trend towards aridity with periods of more humid or more arid climate. The present dry phase began about 1000 years ago and it is estimated that the Chalbi lake dried up sometime around the 12th century A.D. (Stiles, 1982). It is possible that it was shortly after this, perhaps during the 14th century, that the first camel pastoralists moved into the region from the northeast, though research on this question is only in its initial stages.

The arrival or adoption of a permanent camel, as opposed to cattle, pastoralist economic system is probably the most reliable indicator that substantial environmental degradation- desertification- has occurred in a region. There is currently a debate about whether overgrazing by livestock is a cause of desertification, or whether desertification is even occurring in areas occupied by pastoralists (Warren and Maizels, 1977; U.S.A.I.D., 1980; Horowitz 1980: 69-75). The point of view that an area may not be degrading in the long run is based on the ability of rangeland to recover its productivity after a drought period ends, and that it is not known whether the recent well-publicized droughts in the Sahel and eastern African are part of a long term trend or only short term fluctuations.

The geological, palynological, and archaeological record is quite unambiguous about the fact that there has been a general drying trend over the past three or four millennia in northern and eastern Africa, and that this trend has been reflected in changing human adaptive responses (Williams and Faure, 1979). The Sahelian disaster can probably best be interpreted as a manifestation of what will happen anywhere when an unbalanced ecosystem is struck by a drier than normal fluctuation during this longer term dry phase. It also demonstrated how unadaptive cattle are in overpopulated, marginal areas. The same conditions that led to the Sahelian catastrophe exist today in northern Kenya, though in an earlier stage of development and on a smaller scale.

In the far north of Kenya are located, from west to east, the Turkana, Rendille, Gabbra, Boran, and Somali pastoral peoples. South of the Turkana and

Rendille live the Pokot, Ariaal, and Samburu pastoralists. Up until the beginning of the 20th century the Turkana and Boran were full cattle pastoralists, most families owning no camels at all. Camels are now common amongst the Turkana, few families owning none. The Boran are also accumulating camels, particularly those groups who have lost Boran traditions proscribing the use of camels for food by migration to the south, away from the current Boran homeland in southern Ethiopia and northern Kenya (Dahl, 1979). The Gabbra camel pastoralists have also involuntarily reduced the proportion of cattle in their herds due to a general decline in the productivity of the rangeland, and some families own no cattle at all (Torry, 1973; personal field research).

Cattle pastoralists do not add camels to their herds unless there is good reason to do so. Camels are expensive to acquire, they are more difficult than cattle to look after, and they increase labour requirements by their particular dietary needs and watering habits. People make the investment because camels are better adapted to degraded rangeland and camels provide a larger and more reliable food supply than do cattle. The Pokot and Samburu cattle pastoralists have recently begun adding camels to their herds, an indication that for them desertification is not a short term fluctuation, but rather a long term trend. They are preparing for the future, as did pastoralists before them further to the north.

Kenya is the southern limit of the camel in Africa (Pratt and Gwynne, 1977: 153), and that southern limit is still expanding. Camels did not move south earlier because people did not need them and the environment was not suitable for them. That these two conditions have changed is illustrated by the presence of grazing camels around the shores of Lake Baringo and along the banks of the Uaso Nyiro river, something unheard of fifty years ago.

Several recent studies support a view that desertification in northern Kenya is due primarily to overgrazing and overstocking (Spencer 1973; Pratt and Gwynne 1977; Lewis 1977; Lusigi 1981). Overstocking is due mainly to overpopulation, as more domestic animals are needed to feed larger human populations. The pastoral system of Turkana District, inhabited almost entirely by the Turkana people, has to a large extent broken down under the strain imposed by the droughts of the 1970s. The population density is almost three persons per square kilometre, and a large number of those people are on famine relief or are becoming fishermen or cultivators in development schemes. There has also been a high rate of out-migration, mostly into Samburu country. The traditional system of pastoralism has been highly perturbed and it is extremely unlikely that it will ever fully recover, due mainly to development projects changing the entire basis of socio-economic life.

East of Turkana in Marsabit District the population density is less than one person per square kilometre. The lowland average annual rainfall is about equal between the two districts, at approximately 150-300 mm, but the pastoral system has been much less affected by the droughts. Lower population density and a higher incidence of camel pastoralism is undoubtedly responsible for the far superior condition of the range and more intact state of traditional social and economic institutions in Marsabit District. This is in relative terms, however. In absolute terms the situation is not good.

Livestock can still supply the food and other economic needs of the majority of the population, but with human population growth that will not always be the case. The 'famine relief syndrome' has already begun in Marsabit District as well. Famine relief and agricultural development projects stimulate population growth and sedentary settlement, two of the main causes of desertification in pastoral areas (Salzman, 1980).

Development projects involving agricultural food production in pastoral societies have been a response in the first instance to people losing their herds through drought or disease. This is part of the larger, more general problem of the rangelands no longer having enough productivity to sustain livestock populations sufficient to provide for the growing human population, creating dispossessed people from the surplus. In former days, the surplus who could not rebuild their herds through the traditional social security system involving kinship and stock associate ties would join client hunter-gather groups (Nilotic: *il torobo*; Cushitic: *wata*). That option has been superseded today by famine relief centres and out-migration to urban areas, or to the agriculture schemes.

Rather than feed destitute people on famine relief grain, the argument goes, teach them and give them land to grow their own. This has been the policy applied on the Marsabit highlands in response to the large livestock losses experienced by the cattle-keeping Boran and, to a lesser extent, the Gabbra and Rendille camel pastoralists in response to the severe droughts of the 1970s. Extensive areas of land have been cleared for maize farming. These new farms have been successful in producing grain, but they have also had detrimental consequences. Increasing population and decreasing forest have put great strains on the hydrological balance of the highland massive, creating chronic water shortages in Marsabit town. There are pressures to destroy more of the forest, which if allowed to happen would have serious consequences for the lowland hydrology as well. Forested highlands form the water catchment which is the source for most of the lowland water table. The problems affecting Marsabit apply to the other Northern Kenya mountain areas as well (Synott, 1979).

Given the fragile ecology of the region, it would be more sensible to develop a pastoral system that would reduce pressure on the rangelands and mountain forests and at the same time increase long range economic security for the pastoralists. The only way of achieving these objectives would be to stabilize population growth and prevent overstocking. Increased agricultural production can only lead to a destructive dead-end in the long run as water catchment forests are destroyed, the better grazing lands are alienated, and population overreaches the ultimate carrying capacity of the land. The future of northern Kenya lies in pastoralism.

But how to stabilize population growth and prevent overstocking?

These two principal objectives cannot be achieved without the full cooperation and backing of the pastoralists in the measures to be taken. The way to obtain this cooperation and backing is to involve them in the planning stages of any proposed changes to the traditional pastoralist system. This will necessitate using pastoralist knowledge and values which, it is hoped, would lead to the creation of a new system to replace the old. It is imperative that a system of livestock and rangeland management exist for any long term change to result that will be beneficial to both man and the environment. Stop-gap projects with isolated goals might produce effective short term results,

but these will not be of use in the future if the human behaviour which led to the desired results is not part of a system of behaviour. If the system is not there, the behaviour will cease as soon as the outside stimulus which produced it is gone.

The present system must first be understood before something better can be devised to replace it. The pastoralists themselves are best placed for that. They could, however, benefit from education about areas of which they are not fully cognizant of or do not comprehend. How to avoid causing desertification is one of those areas. They know, of course, that overstocking leads to overgrazing, but the connexion between vegetation loss and environmental degradation is not always made. For example, a sample of 167 Rendille and Gabbra elders gave the following results to questions concerning soil loss (Gufu, 1982):

<u>Can soil be degraded?</u>	
Yes	% 15.6
No	84.4
<u>Would overgrazing cause loss of soil?</u>	
Yes	44.3
No	55.7
<u>Would excessive tree felling cause soil loss?</u>	
Yes	32.9
No	76.1

A distinct majority of pastoralists does not believe that overgrazing or tree felling causes soil loss, one of the principal phenomenon of desertification.

It is important to begin by changing peoples' perceptions and attitudes about the effects of their own way of life on the environment and to convince them that change is needed. Working in cooperation with pastoralists, planners can use aspects of the traditional system to effectuate change for the better. To halt desertification there has to be a reduction in the quantity of vegetation consumed and destroyed by the trampling hooves of livestock, and the amount cut down for construction of stock pens and use as firewood by man.

As will be demonstrated below, cattle and small stock are the principal agents of desertification. To halt desertification, then, it follows logically that the numbers of these animals have to be reduced. Governmental coercion has not worked in the past as a permanent solution to livestock reduction, and it would not work in the future. Coercion is not part of a system that could be politically maintained or economically feasible in the long run. Here we run into the real problem: the economics of offtake. The closely interrelated problems of offtake, marketing, investment opportunities, and economic security is one of the greatest challenges facing those interested in improving the life of pastoralists and halting desertification. A system better than the traditional one has to be devised in order for the pastoralists to accept it.

The present system is based on the principle of every individual doing his utmost to maximize the size of his herd. One of the reasons for wanting to do this is to have a steady food supply, and another is to have a large enough herd to leave a viable number of survivors from which to rebuild

the herd after a severe drought, epizootic, or raid. Livestock is much more than simply a source of food for the East African pastoralist, though. Animals function in the same way that money does, and they are used to establish a complex web of social relationships that are used to promote economic security and political influence on behalf of the owner (Schneider, 1981). It is these last two points that too often are not appreciated by planners. Animals are repositories of value, and they are used as a medium of exchange and as a means of deferred payment. The value of a cow or goat changes little over time; the same cannot be said of money. What could be a better investment than livestock for a pastoralist?

It has been argued that offtake rates could be increased if grain and other commodities were made more available to pastoralists. Pastoralists in settlements far from shops will forgo selling an animal because of the distance involved in getting it there. What people who advance the availability argument tend to forget is that if grain cannot be bought, the animal intended for trade is eaten. One goat sold would yield enough money to buy about 40 kg of maize flour. The average family would finish off the goat in one or two days; 40 kg of flour would last at least two weeks, and it would provide significantly more calories. During the dry season, when milk is scarce, it is not certain that more animals would be sold than would normally be eaten if markets were available to the pastoralists. As long as animals were not dying from lack of pasture readily available grain might even reduce net offtake, though how much might be spent on other commodities would be a determining factor.

In any case, livestock sales are seen by the pastoralist as coming from his capital, thus no more animals will be sold than are needed to obtain specific commodities of need. Unlimited availability of consumer items will not lead to unlimited offtake, under normal conditions. The wise pastoralist will still maintain a large enough number of animals to spread and increase his economic and political web, and in the long run will still try and realize a net increase in the size of his herds even after all food and socio-cultural needs have been met. That is the system.

If a net reduction of animal numbers is desired, an investment opportunity more attractive than livestock has to be offered. Would money in the bank be a good alternative investment? From two standpoints, the answer is no.

Firstly, it would mean a herdowner is reducing his political influence, economic security, and disrupting many social obligations. The head of a household has control over the family herds, but he does not 'own' all of the animals. Many, if not most, belong to wives and children, having been given over the years as gifts at ceremonial occasions. The head of the household owns only a residual herd, and some of these animals might be loans or gifts from other pastoralists to create bonds, part of the social web referred to earlier. The household head would come under severe criticism by family members and the community as a whole if he sold off large numbers of animals belonging legally to others, especially to his sons, who depend on the gift of animals and accumulated offspring to build their own herds after the father dies.

Secondly, capital increases at a higher rate with livestock than with money. A two-year term account will yield about 13% in Kenya currently. Inflation is higher than that, thus there is a net loss in purchasing power at the end of the two years. In addition, there is the financial loss of sacrificing interest accrued if the principal has to be withdrawn prior to

term due to some emergency need. Emergencies are common to pastoralists. Cattle and small stock normally reproduce at a rate well above 13% annually, and their monetary value increases with inflation. The value of a herd of 100 cattle, growing at a 15% annual rate in a national economy with 20% inflation, will be worth 35% more in monetary terms in one year's time, assuming stable beef prices (a valid assumption since meat prices are controlled in Kenya). A 35% real gain on capital is obviously preferable to a 7% loss.

The average pastoralist would not perceive the situation in the same way, but he would be shrewd enough to conclude that owning 300 kg of meat, milk, and blood which every year cost more to buy was a better investment than 1000 shillings of flimsy paper, far away someplace in the care of strangers, which every year purchased less. Besides, the cow produced readily available milk and blood while not losing a cent in value, and it produced more cows, and it was there on hand to be sold in case of an emergency- money has none of these qualities.

Keeping livestock on the hoof, though, is a risk, and none know the risks better than northern Kenya pastoralists. They would be expected to be in favour, in principle, of some form of disaster insurance scheme. Contributions would presumably be made towards insurance by proceeds from stock sales. To make the insurance scheme more attractive than a bank the payoff could be in the form of stock units or a given weight of maize meal, items which increase in value with inflation. The exact mechanism would have to be developed with the pastoralists themselves to ensure their acceptance of it. If the scheme was demonstrated to be effective following a disaster, the pastoralists might then trust it enough to reduce herd sizes, but there are many problems to be overcome with an insurance scheme (Aronson, 1978) and it would be difficult, though not impossible, to be made effective.

There is a rather unorthodox solution to many of the problems concerning the halt of desertification and increased offtake. This solution involves actively encouraging and assisting all northern Kenya pastoralists to intensify camel pastoralism and commensurately to reduce dependance on cattle and small stock. To state it in an oversimplified form, the pastoralists would be asked to sell cattle and small stock and reinvest in camels. Investing in livestock would be following a fundamental instinct and part of their traditional system. The value of the herd would not drop, food production potential would be greatly increased, the social web woven by livestock exchange could still function, population growth could be stabilized, and overstocking could be avoided- maybe.

Historically, camel pastoralism has arrived in a region only after the desert has been created. Perhaps if the camel were to arrive before, the desert would not follow. The camel is a poorly understood and highly underestimated animal by everyone except pastoralists who have had experience with them. The camel has significant advantages over other livestock species in the following areas:

- 1) food production
- 2) consumption of and extent of damage to vegetation
- 3) human population control

Table 1 compares and contrasts camels and cattle in these important areas.

Table 1. Comparison of camels and cattle in important areas.

	<u>Camel</u>	<u>Cattle</u>
Annual milk production for human use, one cow	1300 ¹ -2500 ²	112-420 ² litres
Lactation period	47-72 weeks ^{1,2}	16-60 weeks ^{2,3}
Herd of 100, annual production ⁴		
- milk	24,820 kg	6,615 kg
- meat	675 kg	960 kg
- blood	356 kg	480 kg
- total protein	1,100 kg	410 kg
- total energy	18,730,000 KCAL	7,882,500 KCAL
Dry matter intake	10 kg/day ¹ 3650 kg/year	7.5 kg/day ³ 2737.5 kg/year
Typical herd annual growth rate ⁴	1.5%	3.4%
Maximum herd annual growth rate	7.5% ⁴	15.0% ^{5,6}
Herd size necessary to sustain ⁴ average family of 6 people	28	64
Diet	Trees & shrubs ⁷ 70%	Grass ³ 80%
Mobility	High ⁸	Moderate ^{5,9}
Trampling affects	Light ⁸	Heavy ^{3,5}
Pastoralist degree of polygyny	Low ^{5,8}	High ^{5,9}
Human population growth	Low ^{10,11}	High ^{5,10}

Sources

1. Field, 1979a
2. Pratt and Gwynne, 1977
3. Lewis, 1977
4. Dahl and Hjort, 1976
5. Spencer, 1973
6. Schneider, 1981
7. Field, 1979b
8. Torry, 1973
9. Gulliver, 1955
10. Sobania, 1979
11. Rainy, 1976, pp. 47 and 51.

Food Production

The average female camel produces from five to ten times as much milk per lactation as a cow, it can produce up to a maximum of 21 litres of milk a day, while 5 litres is a very large amount for a northern Kenya cow, and the total amount of protein and energy produced annually by a herd of one hundred camels under traditional management methods is about two and a half times the quantity produced by one hundred cattle. With changes in herd structure and management techniques it would be possible to increase significantly food production from camels.

The camel also has advantages over the cow in that its life span and milk-giving period is much longer, thus fewer calves will give rise to more milk-givers (Dahl and Hjort, 1976, p. 95). The average lactation period of a female camel is about one year, of the cow about nine months or less (though variability is great), and the camel continues to produce adequately through the dry season while the cow dries up to a trickle. This means that annual reliability of milk production is much higher with camels, an extremely important point if food requirements are going to be maintained while reducing herd sizes.

In general, one can say that cattle in semi-arid and arid lands under traditional herd management methods are very poor food producers (Pratt and Gwynne, 1977).

Effects on Vegetation

The camel has a much more varied diet than the cow. It prefers shrubs and trees, but can also do very well on grass (Field, 1979b). The camel is better adapted to browsing, and because of its great height it can feed at all stories of vegetation up to about 2.5 metres. Camels can travel much further to graze in a day than cattle, thus utilizing the vegetation surrounding a settlement with lower intensity. Camels also tend to disperse over great areas while feeding, another factor preventing overgrazing of pastures. Camel dispersal also means that the effects of trampling will be minimal, thus allowing growth of grass and seedlings in the understory.

Cattle feed primarily on grass, though they will also eat herbs and tender leaves in the lower vegetation stories. They cannot travel as far as camels to graze and they tend to stay grouped together. Cattle intensely utilize and trample grass and the understory in a relatively short radius around the settlement and between the settlement and watering place. Because cattle must be watered at least every third day a settlement with cattle is rarely located more than 40 km from water, and 10 to 20 km is normal. Camels can be located up to 80 km from water when the pasture is good (Torry, 1973). Camel pastoralists can therefore exploit a much larger proportion of the available range than cattle pastoralists, thus lowering the probability of overgrazing any given area.

A more even distribution of pastoral settlements over the land also means that woody plants will not be overexploited by man. When settlements congregate near permanent water sources localized barren lands are created. Trees and shrubs are cut down to make stock enclosures, cooking fires, houses,

etc., and the exploited area moves out concentrically with time. There is no possibility of plant regeneration because utilization rates are too high.

The camel is much more efficient than the cow in terms of vegetation consumed for milk produced. Given average grazing conditions, a camel can produce 1900 litres of milk for human consumption a year (the average of the range in table 1). The cow will produce about 300 litres under the same conditions for human consumption. A 400 kg camel will consume on the average 10 kg of vegetation, dry matter a day, or 3650 kg a year (Field, 1979b), while the 300 kg cow will consume about 7.5 kg a day, or 2737.5 kg a year (Lewis, 1977). This calculates to approximately 1.9 kg of dry matter to produce one litre of milk for family use with the camel as compared to about 9.1 kg of dry matter for that same litre with the cow. The camel is almost five times more efficient in converting vegetation to milk for human use on an annual basis!

Since many fewer camels are needed to feed the reference family of six than are cattle (28:64), one can estimate that the impact of a subsistence camel herd on the environment would be on the order of one-third to one-fourth less than a subsistence cattle herd, since each camel is also much less destructive on the vegetation than each cow or bull.

Population Control

If there is a high correlation in a linear relationship between the number of animals necessary to feed one person, then human population growth cannot exceed herd growth, unless there are supplemental sources of food. Except for the Turkana and Pokot, grain has not formed a significant part of the diet with northern Kenya pastoralists until the 20th century.

The growth potential of cattle herds is double that of camel herds, though the rates vary with conditions. Spencer (1973) and others have stated that cattle herds can double in five years under favorable conditions, while it would take more than ten years for the camel herd, though even twenty years would be considered fast by most camel herders. These vastly different growth rates have implications for social institutions related to human reproduction.

Cattle people are highly polygynous (>90%), camel men rarely have more than one wife (<10%). This creates a transference of women from camel societies to cattle societies, hence raising population growth in the latter (Spencer, 1973). When a cattle man dies, his herd is distributed to all of his sons, each son receiving his allocation upon marrying. Each one then rapidly builds a family and herd of his own. When the camel man dies, the herd is nominally inherited by the eldest married son, as it is considered unpropitious to divide camel herds. Other family members have stock rights, but the herd will only be partitioned between married brothers when it is large enough to operate as two or more independent subsistence herds. This system slows marriage and family growth.¹

Camel people promote more rigorous birth spacing and sexual abstinence rules than cattle people, the men marry later, and there are more situations when infanticide will be practised. The Rendille practise a system of delayed marriage for about one-third of the female population (sepadi) (Rainy, 1976: 51).

Amongst the Gabbra, a man is not allowed to have a child until his mother has ceased child-bearing.

Kenyan population census statistics support the contention that there is a significant difference in growth rates between cattle and camel people. In 1979 the Samburu numbered 73,625 and in 1969 the figure was 54,796. This makes an overall growth of 34.4%, or about 2.9% annually. The Rendille grew from 18,729 in 1969 to 21,794 in 1979, an overall growth of only 16.4% and an annual growth rate of about 1.6%, one of the lowest in Kenya. The Samburu, living in a poor area for cattle, still grew at a rate almost double that of the Rendille. Even the absolute numbers of these two peoples, both long resident in Kenya, illustrate that cattle people sustain larger populations than camel people.²

The actual situation is obviously much more complex than the above discussion suggests, since all northern Kenya pastoralists have large numbers of sheep and goats, many households have both cattle and camels, and grain can be bought in villages and towns. These complications do not alter the general thesis that camels are better food producers and are better for the environment than the other stock animals.

In regions of highly variable climatic and environmental seasonal changes a multi-species herd strategy is usually considered to insure the highest potential for an uninterrupted food supply. This conventional wisdom can be questioned, however, on the grounds that more camels and fewer cattle and small stock would result in healthier rangeland entering a drought period, thus animals would be better fed and the fewer animals would produce more milk. Even with no cattle at all a relatively small number of milch camels could supply most of the nutrition needs of a family, supplemented by meat from small stock. If people depended on camels during extended drought periods people would suffer much less from the high degree of herd size fluctuations common to cattle and small stock.

Sheep and goats probably do more damage to the environment than any other animal except man. Their milk production is pitiful. Field (1979a) estimates that a sheep will produce about 59 litres of milk and a goat about 88 litres of milk for human consumption in a year. One camel can produce as much as the annual total of one of both in two weeks. The real value of small stock is to provide meat and money, but the cost to the rangelands is extremely high. Trading in goats and sheep for camels would improve both the economic security of the pastoralists and the condition of the land, insuring pasture for future generations. Smaller herds would still supply the meat and money needs of people, and still provide the tea milk.

It is currently impossible to obtain a camel for sheep or goats, and even with cattle it is not easy. The Rendille and Gabbra have traditions against selling camels, and it is considered highly unpropitious to give or trade camels with cattle people. The Turkana are the main suppliers of camels to the Pokot (who raid them) and Samburu (who buy them), but the supply does not meet the demand and as a consequence camels are expensive. The only way to provide enough camels would be to raise them under controlled conditions on a breeding station(s). Camel reproduction rates could be increased substantially with proper feeding and veterinary care of the young.

The traditional period of converting cattle pastoralists to camel pastoralism would not be simple years, nor would any of the pastoralists initially take kindly to the concept of small cattle and small stock herds. Their acceptance of the scheme would come when they realized the value of camels, camels were available, and that to obtain them all they had to do was exchange a certain number of cattle or small stock. The first step would be to devise a multi-faceted program in cooperation with the pastoralists. The necessary components would be:

1. An educational and incentive package to motivate pastoralists, particularly the cattle herders, to lower drastically non-camel livestock numbers and reinvest in camels.

2. Camel breeding stations to supply the needed camels.

3. A marketing system that functions and a price support scheme to offer advantageous «trade-in» rates and fair prices for those who want money.

4. Herd management and veterinary programs to upgrade the quality of camels, and also to assist those pastoralists not familiar with camels.

5. A program to reduce concentrations of people and livestock around permanent settlements. This would entail reducing famine relief, rehabilitating destitute families with livestock, strict range management in the local vicinity, the introduction of energy-saving cooking technology, and strict rules governing use of local vegetation for bomas and firewood.³ Artificial fencing might prove practicable for the more permanent residents.

6. Improve security in the areas that are currently not used in buffer zones between hostile groups so as to open up larger grazing areas.

7. Devise a disaster insurance scheme that would absorb excess animals and money not needed for other purposes.

Problems to overcome:

1. The Kenyan government desires increased meat production from northern Kenya for the urban areas of the south. Increased offtake of beef and mutton would result for several years with the proposed scheme, but a limit of herd reduction would eventually be reached below which the pastoralists would be unlikely to go.

2. What to do with the highland areas? Camels do not do well in the highlands, cattle do. It is not realistic to expect Samburu of Mt. Kulal or the Leroghi Plateau to convert to camel pastoralism, nor would it necessarily be desirable.⁴

3. Once camel herds reached optimum size to insure economic security and satisfy socio-cultural needs, how might they be controlled to remain at that level? Camels, too, can become environmentally deleterious in sufficient numbers.

4. How to prevent «progress» from destroying the social fabric of pastoral life, thus making any new system impossible? The Kenyan government is committed to improving social services and to diversifying the pastoral economy: «development» (Migot-Adholla and Little, 1981). The paradox of pastoral development as it is presently conceived is that it is self-defeating. It implies growth in an environment that cannot sustain it. Altering current modes of economic production will only dispossess the many and concentrate wealth into the hands of an elite, a process already in its incipient stages in some areas.

«Development» also calls for bringing pastoralists «into the 20th century», which in reality means forcing them to conform to what Westerners and the Westernized understand by «the 20th century». Pastoralists in northern Kenya are already in the 20th century, and with a few modifications to their way of life they have a system that has the potential to far outlast many others, while at the same time providing a rich and satisfying life to members of society.

Any argument in favor of preserving traditional social institutions and structures is accused of being unrealistic, backward, and of wanting to create a «living museum» out of the people. Criticisms of the view which advocates building upon existing social and economic foundations ignore the reality of empirical evidence of what happens when those institutions break down: alienation, urban poverty, crime, family stress, ad infinitum. It is still possible for northern Kenya pastoralists to escape that fate, but will they?

FOOTNOTES

1. I have greatly oversimplified the complexity and variability of livestock inheritance rules in order to emphasize the essential points.
2. None of the other groups in northern Kenya can be used to illustrate population growth rates of pastoralists. Many Boran, Gabbra, and Somali have immigrated into Kenya and the Turkana lost an unusually large number of people during the drought years. The Turkana registered the lowest overall population growth of any people in Kenya: 2% between 1969-79. The richest cattle pastoralists in Kenya, the Orma, more than doubled their population between 1969-79, growing at around 7% a year. All of the statistics are from Government of Kenya census publications.
3. A program of live-wood regulation exists at Kalacha in Gabbra country, enforced by the local county council with fines, which works very well. As a consequence there are few pastoral settlements within 5 km of the town and trees and shrubs are thriving.
4. It might be possible to combine no. 1 and 2 to reach a mutual solution.

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