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Development

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PERCEPTION OF ENVIRONMENT
AMONG KENYAN PASTORALISTS:
IMPLICATIONS FOR DEVELOPMENT

by Gufu Oba

Current problems of Kenya's arid and semi-arid lands (ASAL) have been interpreted as the result of mismanagement of livestock and vegetation by the pastoral nomads (Pratt D. J. and M. D. Gwynne, 1977; William M. Longhurst and Harold F. Heady eds., 1968; Lusigi, W., 1980; D. J. Herlocker and D. Walther, 1980). In view of this, development projects and policy makers have responded by instituting radical changes in the attempt to solve these problems. One such radical policy is based upon the belief that an increase in food crop production in the ASAL will lead to a reduction in livestock numbers (Republic of Kenya, 1978 and 1980; Ottley, R.A. et al, 1978, cited by P. Little, 1983).

The proponents of 'dietary cause' argue that because milk is the pastoralist's basic need he keeps large numbers of females in the herd, which in turn leads to herds with an inherent capacity for very rapid increase when conditions are favourable. This, they claim, is the cause of overgrazing, and thus argue that if milk can be supplemented with grain foods and fish, the need to keep such numbers of animals will not arise.

This argument and the policy on which it is based are the main cause of project failures and their un-anticipated adverse effects on the already fragile environment. For instance, Hogg (1982), reporting on the effects of Rehabilitation Projects on the environment in Turkana district, notes that, along the banks of River Turkwell, bush and tree clearing to pave the way for gardens has caused considerable environmental deterioration. "Such destruction of forest and bush is a direct result of a short sighted emphasis on cultivation as the path to sustained economic development." Similar observations have been made by Helland (1978), who, while acknowledging that temporary subsistence needs of the destitute Turkana family were met by famine camps and fishing, points out that the projects did not take into account the fact that reduction of people's dependence on livestock allowed the herds to grow. "In some cases money earned from fishing was used to import cattle on the very range the degradation of which had forced people into the project in the first place." Such failures of projects will continue as long as developments are seen as from 'without' and not from 'within'.

An important ecological feature of pastoralism often disregarded by development projects is the long co-adaptation both man and his livestock have had with the environment. The co-adaptational responses are embedded in their management and survival strategies. An understanding of pastoralists' perception of the environment and their land use systems may ameliorate the problems experienced by development projects and extension programmes. Such understanding facilitates appreciation of pastoralists' actions and further enhances their cooperation in development programmes. The role of the local pastoralists in the programme is seen to be vital because unless the inhabitants of these areas are willing to cooperate and are made

aware of the causes and consequences of land deterioration, the problems of environmental degradation in their areas will not be solved, even by the government (Ibrahim, 1981).

This paper, based on the results of a questionnaire survey that was administered to 167 elders and herdsman sampled from IPAL study area (Marsabit District, Kenya) shows peoples' environmental perception and management strategies and some implications for development and extension planning.

The respondents were requested to indicate factors that influence their selection of Manyatta sites, range preference, types and uses of soils, use of tree resources, perception of climatic changes, preference of water sources and livestock marketing. Elders and other herdsman were selected because of their knowledge of the environment and the important roles they play in the management of their areas.

The Findings:

Factors to be assessed before siting a Manyatta

As Ayiemba (1982) pointed out, the nomads' perception of an ideal site for locating their camp is heavily influenced by the impact of pastoralism as a means of survival (ref: Table 1). Distance to water (24.6%), distance to pasture (24.9%), availability of kraal materials (21.9%), surface topography and soils (11.3%) and disease vectors (17.3%) were seen to influence decisions on where to build a Manyatta.

Table 1

Factors to be assessed before siting a Manyatta

Factors	%
Distance to water	24.6
Distance to pasture	24.9
Surface topography and soils	11.3
Availability of kraal materials	21.9
Disease vectors, eg. ticks	17.3

Source: Survey data 1982.

In the recent years, Gabra, Rendille and Borana nomads have increasingly settled down. Towns, some of which have grown out of nomadic camps into their present administrative status, provide the nomads with security, famine relief, permanent water source, schools, consumer goods, and health services. Despite their importance, no respondent mentioned them (towns) as a factor influencing their decision on where to build a manyatta (c.f. Ayiemba, 1982).

In and around these centers, supplies of kraal materials were in such shortage that people hauled them from far distances to their manyattas using donkeys, camels and even motor cars. Though the kraal materials were in short supply, their importance was over-ridden by other factors such as security.

Range preference: a basis of traditional land use

The pastoral nomads of Northern Kenya associate a range area with particular land use. They consider various environmental factors in making such decisions (Table 2). They refer to areas of their range as "camel country" or "cattle country" or "sheep and goat country". The majority of the respondents (99.4%) interviewed claimed that they had preferences for the areas of the range they used. These preferences were based on water availability (32.9%), vegetation types (32.7%), soil types (11.6%), presence or absence of disease vectors (22.7%).

Table 2

Range Preference:	%
Yes	99.4
No	0.6
<u>Parameters used for range selection:</u>	
Water availability	32.9
Vegetation types	32.7
Soil types	11.6
Disease vectors, e.g., ticks, tsetse	22.7

Source: Survey data 1982.

Their reference to the areas of the range as this or that animal's country was based on the abundance of plant species often preferred by the named livestock or other range conditions bearing on livestock. The Rendille nomads say, such areas have fuur. Fuur, according to them is a thing in the range not quite known but claimed to make their livestock fat even with the absence of pasture. Some other areas of the range which may have pasture were not preferred by livestock because it lacked fuur. Livestock grazed on such areas of the range were claimed to grow thin despite the plentiful pasture. These areas were avoided by pastoral settlements.

The concept of fuur does not imply total rejection of these areas. For example, an area that is claimed to have fuur for one livestock type may not necessarily have it for another. Thus areas of the range inhabited by camel owning families were claimed to have fuur for camels but not for cattle and vice versa.

Gabra and Borana nomads have similar expressions in their languages too. Gabra call such range suitability koshee and Borana call it chiisa.³ This evidence of people's conception of range suitability has important implications for management and educational programmes. First, when making grazing plans, all the requirements of camels, cattle, sheep and goats should be considered. But grazing schemes are often designed on the needs of cattle, even when the community has other livestock such as camels and sheep and goats. This was the main problem that put to test the viability of Block Grazing schemes in north eastern Kenya. Helland (1980 p.141) commenting on this, argues that:

As the economic justification for the development of the grazing blocks hinges on increasing the supply of immature cattle, the boundaries of the blocks and the grazing plans have been drawn up based primarily on the needs of cattle husbandry. The pastoralists in the area, however, keep camels, sheep and goats as well as cattle, and these other species have different requirements with respect to forage, water and salt. In many cases, it may be difficult, if not impossible, for a pastoralist to meet the needs of all of his animals while adhering to the grazing plan on any particular block.

Second, the concept of fuur is also being misused, because the areas claimed to have it are the most degraded today. Therefore, there is a need to help the pastoralists to be aware of this problem, if the rehabilitation and conservation of their environment is to succeed.

Third, diseases which are more prevalent in some areas than others have influenced people's conception of fuur, although this may be realized by them. For example, in high altitude areas such as Mount Kulal and Marsabit, a higher incidence of helminthiasis (gastro-worm infections) has been reported (Omara Opyene, 1982; T. Rutagwenda, 1981) than in the low desert country. The significance of these worms for the loss in weight and death of the livestock was not understood by the pastoralists; the decline they attribute to the area's lack of fuur. The use of drenching drugs introduced to them may help them to appreciate that the loss in condition by their livestock is not necessarily attributed to the area's lack of fuur but disease or worm infections.

The response (22.7%) that disease vectors such as ticks influenced their use of a range is also worth considering. In IPAL study area for example, Wilson, J. S. et al (1980) has shown that contributing to camel calf mortality was disease carried by

some species of mites which Rendille and Gabra respectively called chiilim and yagaal.

They believed that camel manure "bred" the mites. This is why both Gabra and Rendille camel owning families seldom stay in one place for a long time.

Soil types, preferences and degradation

Rendille, Gabra and Borana pastoralists are very familiar with soil types found in their areas of the range (Table 3a). It is in fact one of the factors underlying the concept of fuur. Each soil type common in a locality is known by a local name, in the language of the group that inhabits the area.

For example, the following are names of some soil types in Borana: Koticha (black cotton soil), mansa (sandy soil), chiracha (granitic soil), kakata (hard stony ground with lava), malbe (soil of internal drainage area), wayama (red lateritic soils), boji (chalky soil or soils of limestone), and ramata (sand mixed with clay).

Table 3a

Soil Names	%
Yes	100
No	0.0
<u>Any relationship between soil types and land use?</u>	
Yes	89.0
No	10.2

All the respondents (100%) were able to name soil types found in their areas. 89.9% believed that there was a close relationship between soil types and range use. Both Gabra and Rendille respondents, for instance, pointed out that "soil baths" or gangalimo was a pre-requisite for camels in any area of the range they inhabited. Chalky soil (boji) was claimed to be most favoured by camels, while cattle on the other hand favoured it least because of soft and dusty terrain; cattle favoured wayama (red lateritic soils) and koticha (black cotton soil). Sheep and goats on their part most preferred wayama (red lateritic soils), and kakata (hard stony ground with lava rocks).

Chambers (1969) in his discussion with Somali elders living in north eastern Kenya has also reported that they described different ecological conditions for livestock in terms of soil types. According to him Somali herders were unanimous that grazing on different soils affected the well being, size and reproduction of cattle as well as camels;

While pastoralists are well aware of differences in soil type, to what extent are they aware of soil degradation?

Table 3b

Can soil be degraded?	%
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 loss of soil?</u>	
Yes	32.9
No	76.6

Source: Survey data 1982.

The above results were anomalous with the previous findings (cf. Tables 2 and 3a). The reasons for this can be appreciated from the pastoralists' point of view of 'degradation'. First, as Brian Spooner (1973) puts it "the pastoralists exercise little interest in the conservation of their grazing resources as a long term strategy. They therefore exhibit the general attitude that if pasture in one area is exhausted, they can always move on." To them, therefore, degradation of the environment meant deterioration of pasture, and not soil. Importance of soil is expressed only as long as the associated vegetation is present.

Second, Gabra, Rendille and Borana pastoralists all have expressions in their language to describe the degradation of vegetation cover. For example, when Rendille want to say that their land has been severely overgrazed, they say hara abarbathwate, which means the ground is so bare that there is not a piece of grass to be seen;

Borana and Gabra say lafti barbadha diluuni uuba infuune, which means the land is so much overgrazed that even when the after-birth of cattle⁴ is dragged on the ground it will not pick up a piece of grass.

These observations have important educational and extension implications; unless the inhabitants of these areas understand the relationships between overgrazing and soil degradation, and excessive tree felling and general environmental deterioration, the problems of environment will not be solved. This awareness can be developed through nonformal education and extension programmes. Through these programmes, they will be helped to appreciate that overgrazing and the destruction of trees expose the soils of their areas to agents of erosion such as surface runoff and wind.

Tree resources, preferences and abundance

As has been shown, the pastoralists associate each vegetation type with particular land use (Table 2). They know each and every plant species by a local name, its uses both as medicine and as livestock pastorage, when it is most preferred and by what livestock type. Trees have other uses to these pastoralists too, and in each case, species are required for making milk containers, stools, ropes, building poles, charcoal, and Kraals or livestock enclosures.

95.8% of the respondents confirmed that their livestock had preference for some tree species to others (Table 4), and some (52.1%) thought that these tree resources were not as abundant as they were some years ago (cf. Table 1), in contrast to others (47.9%) who thought that there was no tree shortage.

Table 4
Tree resources, preferences and abundance

Livestock preference	%
Yes	95.8
No	4.2
<u>Preference of certain tree species for livestock enclosure (kraals)</u>	
Yes	98.2
No	1.8
<u>Are these tree species now as abundant as they were in your areas of settlement?</u>	
Yes	47.9
No	52.1

Source: Survey data 1982.

While it is true to say that mobile pastoral camps have not yet experienced tree shortages for building their night enclosures, trees are in short supply in and around sedentarized settlements. There is now evidence that permanent settlements are largely to blame for hastening desertification processes in northern Kenya (Lamprey 1978).

The human impact on tree resources is one of attitudes such as that tree resources are unlimited, which results in such arguments as " ... even our fathers and fore-fathers had cut trees and still we have them" or "if I do not cut it somebody else will"

The problems of tree destruction can be solved in a number of ways: first, alternative forms of enclosures other than trees should be sought. Live fences built of euphorbia and some commiphora species have been successfully used in some areas of the district. This could easily be adopted if the local population is encouraged to use them. Besides this, stone enclosures were not a new practice in such areas as Dida galgalu, with access to the lavas of Kaisut and the Huri Hills; the nomads have been using lava rocks and stones for building enclosures for young camel and cattle calves, goat kids, and sheep lambs.

Second, IPAL has also introduced another form of livestock enclosure, built out of bamboo. Some of these enclosures are already being successfully used in Korr and

Kargi; all that is now left is to convince the rest of the population (particularly those who have opted to settle down) to adopt this alternative, which will be facilitated if it is made available for a reasonable sum.

But most importantly, people's attitude to their resources have to change. This will be slow among the adult population, but could easily be achieved with youths at school, through appropriate curriculum that emphasizes the teaching of environmental education. Change in attitude among the adult population could also be achieved through increased cooperation and understanding with them, but not through coercion.

Perception of weather and climatic changes

National Weather forecast information is not available to the nomads, but they have their own ways of studying and predicting weather and climatic changes (Table 5). They use the stars (20.5%), lunar phases (27.6%), cloud patterns (30.2%) and studying viscera of slaughtered animals (21.8%). They claimed that such knowledge was known only to time-reckoning experts among those who on their behalf predicted into the future and reminded others of migration, rituals and ceremonial schedules.

Table 5

Knowledge of rain, methods of its prediction
and response to its distribution.

Rainfall predictions	%
Yes	91.6
No	8.4
<u>Elements to be considered</u>	
Stars	20.5
Lunar phases	27.6
Cloud patterns	30.2
Studying viscera of slaughtered animals and others	21.8
<u>Response to rainfall patterns</u>	
Migration	100.0

Source: Survey data 1982.

Rainfall is by far the most significant constraint to life in the district. Its distribution has been found to highly correlate with settlement patterns⁶ (Field 1980). 100% of the respondents claimed that they responded to rainfall patterns by migration. Dolan (1980), studying the migration histories of some Rendille clans and Ariaal did not however observe any difference in migration patterns between wet, dry and average rainfall years. But he did find that areas with permanent water supply were used more extensively during the dry season than during the wet season, and, conversely, that areas with seasonal water were occupied more in the wet season than dry season.

Mobility has always been the key to the survival of the nomads. It is and always has been used as an insurance mechanism to enable escape from unfavourable conditions. While short distance migrations are used to utilize temporally and spatially distributed water and pasture resources, long distance migration, often taking the nomads across international borders, has been used as a survival mechanism when faced by disasters such as droughts.

In northern Kenya, such a drought was experienced in 1973. Borana pastoralists living on Marsabit mountain resorted to long distance migration across the desolated Dida Galgalu, where they lost hundreds of cattle before reaching Ethiopia. Asmaron Legesse (1980) estimates that 60-70% of their herds died on this trek. However, the group that risked the migration (though they waited far too long in the hope of receiving rain) ended up better off than those who opted to remain. The latter lost their herds and some of them were later rehabilitated on farming schemes set up by the government and missionary organizations.

One of the major weaknesses of development programmes that are designed for the pastoral nomads is lack of a "drought insurance scheme"; instead there is an emphasis on rehabilitation. In the words of a 1972 NCCK⁸ report called "Ready for Change" on development in northern Kenya,

...today the old balance between man and environment is destroyed. There is no way back, the big question is, after famine relief-- what?...Overgrazing and dependence on old ways of life make restoration of cattle herds no simple solution. New ways of living must be found for them.

Ten years later Hogg (1982, p. 28) reporting for the same organization advises:

The churches, with their long experience of working in Turkana land, are well placed to initiate new projects. Far too long however they have focused on development of peripheral economic activities, e.g., irrigation agriculture, water harvesting, handcrafts, and avoided tackling the problem of livestock development. Now they have the opportunity in co-operation with the Turkana Rehabilitation Project (TRP), to at least pilot a restocking programme. The NCCK in particular might consider it worthwhile to initiate a small programme, in which say one hundred destitutes were given sufficient small stock to return to the pastoral sector.

These recommendations were made after it was realized that 'finding new ways of

living' for the pastoralists had caught the organization in a web of perpetual dependence, besides causing more environmental problems.

Perception of climatic changes

The respondents claimed that rainfall failures (46.3%), God (37.7%) and overgrazing (16.0%) caused droughts (Table 6). Interviews and discussions held with other elders during a seminar organized by the author for local leaders had also confirmed that a change in environment has had some contribution to rainfall failures. Citing the example of the Huri Hills, the participants pointed out that their fathers had reported the Huri Hills to be forested. Hence the local name Badha huri. In Borana badha means forest, and huri means mist. Both the forest and the mist are now non-existent on the Huri Hills.

The forest had been destroyed by persistent burning by man--and mist has disappeared. Since then, the reliability of the rainfall in the region has also decreased.

Table 6

Perception of climatic changes, drought frequency and people's dependence on famine relief

Factors causing droughts	%
Rainfall failures	46.3
Overgrazing	16.0
God	37.7
<u>Frequency of droughts now as compared to many years ago</u>	
More frequent	80.4
Less frequent	4.8
Neutral	14.8
<u>Number of people depending on famine relief now, as compared to ten years ago</u>	
Increasing	99.4
Decreasing	0.6

Source: Survey data 1982.

Droughts and famines have always left "scars" in the nomads' histories. Each drought and famine has a local name or major event associated with it, for example "...the drought when all Borana cattle went to laga Banya 'or Lake Turkana, Qolla Qolaji (the drought of dry hides). Qola bukiti (the drought when people died of hunger) etc.,..."

Though these droughts took high tolls of both human and livestock lives, people were able to survive on "bush foods" before famine relief assistance was started. The "bush foods" included wild fruits, plant roots and root tubers. Gabra and Borana elders recalled that during oolla bukiti, which occurred in the 1940s, people who fed on meat of starving livestock all died of 'bukiti' (starvation), while those who fed on wild fruits, plant roots and tubers survived.

The most important fruits were those of Grewia spp., Balanites aegyptica, Dobera glabra and Hyphaene crociae. The most important species of Grewia are Grewia villosa (buruudo), Grewia tenax (ogomdi rapacho) and Grewia bicolor (Haroresa).

The fruits of Grewia spp. and those of Hyphaene crociae (qoone) can be stored for as long as a year and still remain edible. The most nutritious fruits that were largely depended upon during periods of food shortage were those of Balanites aegyptica (badana) and Dobera glabra (garse). When the fruits of Balanites aegyptica ripened, they were collected by women and children. The yellow-orange ripe fruits were washed and poured into pots of boiling water. The leaves of Salvadora persica (adhe) were also added to seal off the mouth of the pots. The boiling breaks the soft parts of the fruits, releasing their juice into the water. The result was a thick and sweet orange solution which the Borana call kud'uuba. The leaves of Salvadora persica were removed and the kud'uuba was allowed to cool. During the evening, the cooled kud'uuba was served to the family. The purpose of adding Salvadora persica leaves was to remove the bitterness from the Balanites aegyptica fruit and its kud'uuba. Kud'uuba of Balanites aegyptica is also highly recommended for newly delivered mothers as it is claimed to be highly nutritious and useful as an antidote.

The remaining hard and fibrous seed coats, which have been softened up by boiling, were opened up and the inner cotyledons were eaten the next morning. The cotyledons may be preserved for future use. This was done by drying them in the sun after they had been extracted from their fibrous coats. They were then fried in fat and stored. This formed a highly nutritious meal which was served to family members in small quantities.

The fruits of Dobera glabra (garse) were equally important during periods of food storage. But unlike Balanites aegyptica, the preparation of Dobera glabra fruit was laborious. When the Dobera glabra fruit ripened, all the able-bodied members of the family went out to collect them. The soft fruits were eaten directly by pressing their soft grey coats between the first finger and the thumb, until the beans were squeezed out. The meaty cover of the beans was chewed away and the beans, still covered in white membranes, were preserved. Those which the collectors could not manage to eat on the spot were carried home.

At home, the families depulped the fruits, eating any meaty coats and preserving the beans again. The beans, still covered with white

membranes, were collected together. The white membranes were then bitten away and the green cotyledons extracted. The cotyledons were then boiled in pots and the water poured out and replaced with fresh water several times. The green solution was claimed to be poisonous. When this had been done a number of times, ash was added, together with more fresh water. The ash was claimed to neutralize the bitterness of the fruit and absorb the green colouration formed as a result of boiling the cotyledons. When the cotyledons softened up, the ashy water was drained off and the boiled cotyledons were preserved and washed in more fresh water several times. Small quantities of salt and fat were then added and the result was served to the family. The cotyledons of Dobera can be preserved in a similar way.

Of all the root tubers, the most important was that of Vitovaea pseudosuperlaplap (buuri in Borana and hinaid in Rendille). This is a creeping plant with broad leaves and a huge circular root tuber. Each plant has only one tuber. It was the common food source depended upon during droughts, particularly when the fruit of the trees mentioned above was not in season.

The tubers were dug with sharp sticks and split into pieces. The brown outer cover was peeled off with knives, leaving the inner fleshy parts which were chopped into pieces and boiled together with sodium carbonate (magaado) until a thick porridge was formed, which was then served. The participants claimed that the sodium carbonate neutralized the bitter taste. The vitovaea tubers were, however, required as a food source not because of their nutritive value but because they were available in quantity. The porridge made from them was often eaten together with milk or fat. Porridge of burri without these two ingredients was referred to as buuri gurati - black porridge of buuri, and it was claimed that it could do no more than just help people survive. Like the fruits of Balanites and Dobera, the root tubers of Vitovaea were also preserved. The split pieces were allowed to dry in the sun and stored in skin baskets. During periods of food shortage, they were pounded into powder in mortars and prepared as a thick porridge. (Gufu Oba 1982, pp. 26-30)

Wild fruit, plant roots and tubers are no longer popular, though they are still available. People instead, depend on grain foods either bought from markets, grown or provided through famine relief programmes.

99.4% of the respondents had confirmed that more people now depended on famine relief than some years ago (ref. Table 6). The respondents claimed that their dependence on famine relief had increased because of more frequent droughts (48.0%), livestock rustling (23.8%) and livestock losses attributed to diseases (28.3%).

It is for instance, estimated that in 1978 alone, 25% of the population in Marsabit District was dependent on famine relief (Marsabit Development Plan 1979-1983), while in the neighbouring Turkana District, 40% of the population was supported on famine relief (Hogg 1982).

The increasing dependence on famine relief by the nomadic population explains their inability to cope with changes that affect their traditional economy. Provision of famine relief is however a self-perpetuating problem that once started is difficult

to abandon. This is becoming more and more evident even to the famine relief providing organizations, who now see their only way out of this quagmire of famine relief through rehabilitation efforts.

The early attempts to rehabilitate destitute nomadic families were through re-stocking programmes (Per. Comm. Father Venturino), started among the Gabra. The first programme based its philosophy on the Gabra tradition of livestock exchange system between friends, relatives and agnates through a social obligation which they call dabare (For details, see Torry 1973). According to this custom, a relative or close agnate gives a female camel to a needy partner who has requested it. Such exchange is made on condition that camels so exchanged will not change ownership, nor be slaughtered, sold or exchanged further, without the knowledge of its rightful owner. This applies to the offspring too.

Using this tradition, Father Venturino bought female camels and 'lent them out' to destitute families on the understanding that the animals were dabare--but unlike Gabra traditional practice, they should give back all the offspring both female and male calves to be similarly given to other needy families.

According to Father Venturino, though the plan looked perfect on paper, he had finally to abandon it, because it was not a self sustaining programme, as he had anticipated. People knowing that the offspring would soon be taken away never cared well enough for them, resulting in high calf mortality. Some other families refused to give up the offspring as was agreed, claiming that it was against the Gabra dabare 'laws' to reclaim camels so given out, before their food supplies had improved. Following an alternative strategy, Father Venturino did however, succeed in re-stocking seventeen such families each with ten female camels, at a total cost of Ksh 100,000 (\$10,000) and re-established them in their traditional way of life, this time without giving them any pre-conditions.

The most common rehabilitation approach used by the government and church organizations was to resettle destitute nomadic families on farming schemes, to help them to re-adapt to a new way of living by learning how to farm. Many of these schemes required infusions of large sums of money. The Catholic Mission on its own had set up Manyatta Jillo and Gabra schemes at an estimated cost of Ksh 400,000 (\$40,000) to resettle seventy-five families (Per. Comm. Father John Asteggiano). Similar sums had been spent by NCKK and AIC to resettle destitute Rendille families from Laisamis and Loglogo at Nasikakwe, Songa and Karare, all on Mount Marsabit.

Though no empirical data is yet available, the forest of Mount Marsabit, once a scenic 'island' surrounded by deserts, is disappearing very fast, giving way to farmlands. The consequences of this are certainly not difficult to predict.

The most drastic and possibly most controversial of all the rehabilitation programmes was the villagization of destitute Ariaal and Rendille families in Laisamis and Loglogo. Villages called Sambamba were built by missionaries to accommodate destitute church converts. Individual converts were required to live in these houses provided, even though they were still depending for their living on their small stock (supplemented by famine relief provided by the church).

While consequences of such rehabilitation programmes are yet to be realized, it should suffice to add that their future will not rest on farming schemes, because the district lacks an adequate farming potential. But one thing seems certain: cultivation of marginal lands without the provision of vital ecological information will only lead

to more severe environmental deterioration.

Preferences for water sources

The respondents were also asked whether they had any preference for water sources, and if they did in what order they preferred them (Table 7). They pointed out that a major factor in their order of preference was based on the continuity and availability of water in these sources. Shallow man-made wells were most preferred (30.2%), because their waters were thought to be mineralized, hence reducing the need for salt licks. In addition the shallow wells were claimed to be not labour intensive like Borana tulla wells found in Ethiopia (Asmarom Legesse 1973; Johan Helland 1980).

Boreholes were not first on their list of preferences because of unreliability and problems of fuel supplies. Borehole engines often broke down, forcing people to undertake movement of livestock at a time of the season when it was undesirable. In addition, areas around boreholes are the most degraded in the district today.

"Laga" waters on the other hand were least preferred (5.8%), because they were generally available for only a short while, the waters disappearing into areas not often used by particular groups of pastoralists. The waters of the surface pools and puddles were not high on their preference list (16.4%) either, for similar reason of short continuity; but in terms of land use, it is this water source that enabled the pastoral nomads to exploit the spatially distributed pasture.

Table 7

Water sources, and % order of preference.

Preferences	%
Yes	86.2
No	13.8
<u>Water sources</u>	<u>% order of preference</u>
Man-made wells	30.2
Boreholes	28.6
Dams	19.0
Surface water	16.4
'Laga' water	5.8

Source: Survey data 1982.

Many of the surface storage dams that were constructed in the Rendille Country have either fallen into disuse through silting or are not popular as their waters get spoilt through negligence. Unlike Borana who use a strict water code (Huqa Guleid and Waqo Gedo 1982), the Rendille pastoralists use their water without any form of restrictions. Each herdsman lets livestock into dams without restraint causing serious pollution. The waters of such reservoirs are often left unused because they are grossly polluted with livestock urine and manure.

The Rendille would therefore require more extension work to assist them to change their habits of misusing water. They could in addition be made aware of health problems that are associated with drinking polluted water and helped to realize the advantages of boiling all their drinking water.

Livestock Marketing

The view once held that pastoralists are unwilling to sell their livestock has now been disproved (Njiru 1981). The problem has been that marketing facilities and essential goods needed by the pastoralists are lacking. Therefore:

In order to induce pastoralists to market their animals, one must create conditions that make action meaningful, not only establishing good market conditions but creating incentives for the pastoralists. One must remember that to the pastoralist, livestock particularly cattle and camels are not

merely a food resource, they are also capital essential to all kinds of negotiations involving influence and alliance, they are not merely savings but are the only form of investment available to the pastoral nomads. (Walter Goldschmidt 1980: p. 55)

The respondents confirmed that they had orders of preference in marketing their livestock (Table 8). Goats (60%) and sheep (54.8%) formed the first and second orders of marketing preference followed by cattle and camels in the third and fourth orders (Table 8).

Table 8

% orders of marketing preference

Livestock	% orders of marketing preference			
	1	2	3	4
Goats	60	24	6.2	1.8
Sheep	28.4	54.8	14	1.6
Cattle	11.6	21.2	66	1.2
Camels	0	0	13.8	82.4*

Source: Survey data 1982.

* .2% error.

The respondents claimed that goats were considered first in marketability because they had better market prices than sheep. Gabra and Rendille nomads, however, would sell their camels only as a last resort.

On marketing of livestock, based on sex and age parameters (Table 9), the respondents claimed that they preferred to sell male adults before females and immatures. But if adult males were not available they would prefer to sell male immatures and then lastly females.

Table 9

% order of livestock marketing preference on the basis of sex and age.

sex and age of livestock	% order of marketing preference			
	1	2	3	4
Male immatures	17.6	70.0*	5.6	15.0
Male adults	70.7*	11.6	0.0	3.4
Female immatures	1.5	5.8	61.1*	35.6
Female adults	10.2	11.6	33.3	46.0*

Source: Survey data 1982.

*significant figures

The male adults and immatures formed the first and second orders of preference because they constitute the non-reproductive portion of the livestock population, besides their high demand by livestock traders. Their sale was not seen to affect the herd growth potential. In the absence of males, the respondents claimed that they preferred to sell female immatures next. The female immatures were part of the productive component of the herd, but their sale was not seen to have immediate effect on the food supply of the pastoral families. The sale of the female adults, on the other hand, was seen as a last option, because their sales directly affected the food supply of the families and also the potential growth of the herd.

In addition, the respondents claimed that they preferred to sell their livestock during the dry season (Table 10) when food was in short supply. They said that this was the period of the greatest monetary need, when money was required to buy food to supplement the small amount of milk from livestock. During the wet season, on the other hand, the pastoralists have no food problems as milk yields from their livestock were able to sustain their food requirements to a large extent¹⁰ (Njiru 1981). But, during the dry season, prices paid by stock traders and shopkeepers were low as a result of the poor conditions of the livestock. Thus, the response (3.9%) of the pastoralists to favourable market prices was weak.

Table 10

Reasons for selling livestock	%
When prices are favourable	3.9
During dry season when food supplies are in acute shortage	40.7
Marriage ceremonies	7.8
Buying essential items such as household goods, and clothing	34.6
Others	13.0

Source: Survey data 1982.

The poor response to favourable market prices explains the general low commercial offtakes in the district. For the Rendille, Njiru (op. cit.) had found this to be 3.3%. Even when compared to an FAO figure of 5% (FAO, 1971) maintained by pastoral nomads elsewhere, the figure is still low. The low offtake can be attributed to a number of factors, including:

First, Livestock Marketing Division (LMD), which is the major buyer of livestock from the ASAL districts of Kenya, has had a number of problems: (a) its policy changes very often; (b) its auctions are not well publicized to give cattle owners ample time to drive their cattle from such distant areas as Gatab, N. Horr, Maikona, Laisamis and Loiengalani to Marsabit Market; (c) the type of animal bought is subject to so many LMD policy changes that it is difficult to bring to market the right animals. These problems were well illustrated by Njiru (1981: 87).

In July 1979, the LMD bought all animals above weight of 120 kg. In July 1980, they bought only male animals over 180 kg. Big bulls and old animals however healthy looking, were rejected. In July 1981 the LMD bought male animals between 175 kg. and 350 kg. This auction was closed prematurely because of an outbreak of foot-and-mouth among the purchased animals. In October 1981 LMD were back, but this time they only wanted bulls over 300 kg.

Second, the pastoral production is subsistence based, hence, commercialization of livestock economy has had less impact on the people. In addition, the pastoralists are not served with such investment facilities as banks. It is thus imperative for them to keep herds in excess of the available range resources as insurance against

animal loss.

Third, in rural trading centres, even the most essential goods are often not available in the retail shops. Thus as Njiru (1981: 70) puts it:

Since most nomadic pastoralists live far from the main trading centres, what they can buy is determined by what the traders have on their shelves. In a sense supply creates demand because the desired goods are not available in particular centre, all the pastoralists near will not sell animals because the money from such sale is of no use to them.

Fourth, there may not be large numbers of marketable males in the nomadic herds. So far, there are no figures available to show the proportion of such animals. It is therefore unrealistic to anticipate high offtakes. Development projects operating in the area, in cooperation with the government, should make an effort to determine the available marketable males in the nomadic herds before making any recommendations. Equipped with such information, government agencies and projects may then go ahead and improve the livestock marketing infrastructure to encourage increased offtake. This could be achieved by (a) holding more regular auctions, (b) creating more effective communication between the pastoralists and livestock marketing agencies, e.g., LMD, (c) providing the pastoralists with banking and credit facilities as an insurance scheme against droughts, (d) increasing consumer services in the pastoral areas to enable pastoralists to spend the money they have earned from livestock sales.

CONCLUSION

The pastoral peoples of northern Kenya have a clear perception of their environment. Environmental perception and consequent knowledge acquired has had a tremendous influence in the exploitation of marginal resources in their areas of the range. Using knowledge so developed, they categorize their range areas into what they call "cattle country" or "sheep and goat country" or "camel country". The livestock use of these areas are of course often overlapping. But, during good rainy years, when rainfall is equitably distributed, such divided use of their country is quite evident. According to the evidence available, their land use patterns are correlated with the vegetation types and soil conditions of these areas.

Inherent in their perception of the environment are also attitudes that some of their resources are unlimited (e.g., trees), which shows a lack of concern for the future consequences of shortages of these essential resources. In addition, at least from the results of this survey, they do not seem to appreciate that the destruction of pasture and tree resources does increase soil loss through erosion, which is a major weakness in their land use strategies. These findings have important extension and educational implications, because unless the inhabitants of these areas change their attitude towards the misuse of their resources and begin to appreciate the relationship between vegetation degradation and soil loss, conservation and rehabilitation of their fragile environment will not be possible.

Despite these underlying weaknesses, the pastoralists' flexible responses to the spatially and temporally distributed pasture and water have enabled them to exploit an environment which would have been impossible to exploit under other forms of

land-use systems. Unfortunately, the adaptive mobility of the pastoral nomads, which they have developed for generations, is breaking down today. Such a breakdown of their traditional life pattern has been caused by a number of factors including (a) frequent droughts, that had impoverished the majority of them, (b) poor security against raiding in their home ranges, (c) administrative pressure to sedentarize nomadic populations, (d) a general tendency of voluntary sedentarization, for some families, who feel that they must settle down in order to have their children educated and be near to health and consumer goods services, (e) the attraction of farming as an alternative way of subsisting, e.g., among the Borana. But for the majority of the pastoral families, sedentarization is not a wish but a necessity. For those who have lost their livestock either through droughts or tribal raids, there is no option other than to settle in famine relief camps or to be resettled on farming schemes or organized into fishing cooperatives.

Though settlement programmes were undertaken with the best of intentions, they are still not near rehabilitating the pastoralists. Some of the programmes have added new dimensions to the already existing environment and social problems. For example, induced sedentarization and farming of the marginal areas has caused deterioration of the environment, hastening the processes of desertification. This has set off the vicious cycle of hunger and destitution which the projects and the government had hoped to break.

Development efforts, instead of being based on specific projects, such as fisheries or dry farming, will benefit by working with total systems rather than just parts. Each development should be seen in the broad context, both socially and environmentally. While the environmental implications are becoming evident, some of these projects have not yet clearly defined the role of the people in their programmes, except as being at the "receiving end".

FOOTNOTES

1. This is a revised version of an earlier paper presented during UNESCO-IPAL Orientation seminar in November 1982. (Gufu Oba was formerly an Extension Officer on the UNESCO-MAB Integrated Project on Arid Lands).
2. Manyatta - a Kiswahili word meaning a nomadic or semi-permanent pastoral camp.
3. 'Chiisa' - A Borana word which literally means to lie down.
4. After-birth of cattle are very sticky, immediately it drops on the ground, pieces of grass and soil particles stick to it.
5. IPAL (Integrated Project on Arid Lands) bamboo enclosures are made up of pieces of bamboo woven up into sections. The sections are stuck together and loaded onto trucks and put up in new areas the project livestock moved to. With a bit of care the present bamboo enclosures have been used for four years and are still effective.

Some Rendille pastoralists in Kargi and Korr towns have also been introduced to the use of bamboo enclosures. For the last four years these individuals have

not cut down any trees for building livestock enclosures. The only problem has been that hyenas had got used to them and had torn down some of them and carried away goats. With the limited number of pack camels now available to the Rendilles, bamboo enclosures which need to be transported do not seem to attract those who are still mobile; in addition, there is what they see as "an irrationality" in buying bamboos, when they can get trees for free.

6. Systematic aerial surveys carried out for six consecutive years (both during the dry and wet seasons) had shown that the spatial distribution of livestock, i.e., small stocks, cattle and camels, was correlated with the vegetation type, its conditions--whether green or dry and the amount of surface water available on the ground. The results showed that there was a significant variation between wet season and dry season extent of distribution of both human (no. of huts) and livestock populations.
7. Migration histories (1923-1978) of five Rendille and two Ariaal settlements were compiled from interviews with the elders and analyzed by computer. The data showed that there was a drastic reduction in the home range of the Rendille and Ariaal from 1923 to 1978.
8. NCKK - National Christian Council of Kenya, AIC, African Inland Church.
9. Unlike the nomadic mobile huts, these houses were iron sheet roofed and had cemented floors. Since the pastoralists were not allowed to light fires in them, these houses have not been popular. Many of the families to whom such houses had been assigned, have set up their traditional huts in front of them. The family huts are used as family houses, while the iron sheet roofed ones are used mainly as guest houses. NCKK had at one time a similar project in Moyale--sub-district, where they constructed semi-permanent houses for the sakuye pastoralists on a farming scheme. When droughts struck and the pastoralists dispersed to other areas, these houses were left behind, falling into disuse. This is one of the evidences that some of the programmes designed for these communities conflict with their way of life or are not within their priority needs.
10. The pastoral nomads of northern Kenya no longer live on diets of milk alone; even during the wet season when milk is available in adequate supplies, grain foods are almost always eaten. Mubia E.W. (1981) studying child nutrition in Marsabit District had noted that children of the families living near town centres were more undernourished than those living in pastoral camps. One of the reasons offered was that the families living near town centres sold their milk produce and instead bought food grains, which were bulkier but of less nutritive value to young children. Children of the nomadic families, on the other hand were fed solely on milk, though the adults ate grains too.

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