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WATER RESOURCES AND LIVESTOCK MOVEMENTS
IN SOUTH TURKANA, KENYA

by Rada Dyson-Hudson and J. Terrence McCabe

Most of the 61,768 square kilometers of Turkana District is unsuitable for agriculture because of low rainfall and shallow soils. The major economic activity in the district is raising livestock. Therefore it is important that the pastoral sector be included in development plans for Turkana District. These plans should take into account the environmental knowledge of the local people, who have survived for generations in this harsh and unpredictable environment.

Turkana is the driest region of Kenya. It also suffers from period droughts during which large numbers of livestock die, and people suffer. During 1979 to 1981, there was a very severe drought, and in 1981, 65 to 70,000 people, an estimated 45 to 49 percent of the total population, were receiving famine relief.

Despite the fact that North Turkana generally has higher rainfall and better pastures than does South Turkana, this region was very hard hit by the 1979 to 1981 drought. Probable reasons are that plant growth in this area is dependent on local rainfall; and that cattle, the most drought-susceptible species of livestock, predominate in this region.

Southern South Turkana has a high proportion of highland areas, and two rivers which rise in the Kenya highlands and are not dependent on local rainfall. Trees along these and other water courses tap ground water sources, and provide browse for camels and for goats through much of the year. Water sources are well distributed, and include springs of high mineral content which camels require. The South Turkana herds include large numbers of the drought-resistant livestock species, camels and goats, with relatively few sheep and cattle. The people in this area survived the recent drought with less input of famine relief than in the north.

Since southern South Turkana appears to be less affected by periodic droughts than is central and northern Turkana, this suggests that the livestock sector of the economy of this region can contribute to the Kenyan national economy on a continuing basis. In increasing the integration of this region into the national economy, it is important for development plans to build on the local system of herd management, which takes into account the variability and complexity of resources in the region.

A multi-disciplinary team of Kenyan and U.S. scientists are working in southern South Turkana. The Ngisonyoka section of South Turkana has been selected as the study area because these people are strongly committed to livestock husbandry. Although a full understanding of the Ngisonyoka herd management system will require several years of research, this report on herd movements and water supplies, based on a total of 18 months of field work by J.T. McCabe and 16 months by R. Dyson-Hudson, provides important insights into the South Turkana livestock production system.

Research on Turkana pastoralists is difficult because of the extreme mobility of the people, the dispersion of their herds, and the fact that decisions about herd movements are often made by each individual herd manager. The harshness of the environment, lack of adequate roads, difficulty in obtaining food and water, and problems of security from bandits and neighbouring pastoralists, add to the difficulties of conducting research in the area. Despite these problems, the researchers involved in the South Turkana Ecosystem Project have been able to move freely through Ngisonyoka territory, and experienced no personal danger.

The study of Ngisonyoka herd movements is based on information gained by following the major camps of four extended families over a period of one year; and questioning the herd managers of six extended families about the movements of all their livestock during a two-year period. We were able to get accurate information about the spatial distribution of herds by questioning. Accurate information about temporal distribution could not be elicited.

In order to discuss the water resources and herd movements of southern South Turkana, it is necessary to describe the important topographic features of the area. In broad general terms, these are:

1. The Turkwel River,
2. Naroo: the western outwash plains between the Turkwel River and the Central Mountain Range,
3. The Central Mountain Range,
4. Toma: the sandy outwash plain to the east of the Central Mountain Range,
5. Nadikam: a plains area with many small volcanic hills southeast of Kailongkol Mountain and northwest of the Kerio River,
6. Volcanic hills and river basins between the Kalapata, Nakwakaal and Kerio Rivers,
7. The Loriu Plateau,
8. The Ayangiyang Swamp,
9. Broken country southeast of the Kerio River,

The Turkwel River on the western boundary of Ngisonyoka territory can be counted on to provide water for Ngisonyoka herds. However, the area adjacent to the river cannot be used by livestock, particularly during the rainy season, because of tsetse fly. Since this river system originates in the Cherangani Hills and on Mount Elgon, the abundance of water in the rivers is not necessarily related to the amount of local rainfall and local grazing. The Turkwel provides abundant water even in years when nearby grazing is in very short supply (as in the 1980-1981 dry season). Since there is evidence that zebu cattle who are under nutritional stress can lower their metabolic rate and survive if they have both a low food and a low water intake, the abundance of water in the Turkwel River in a drought year may, in fact, be extremely deleterious to the cattle.

Naroo, the outwash plains between the Central Mountain Range and the Turkwel River, is a major grazing area for Turkana cattle, sheep, and goats, but not considered to be well suited for camels because it lacks mineral springs. Following the rains, there are many water sources along the western pediment of the Central Mountain Range. But almost all of these dry up within a one to four month period, with the exception of Echor a Apau due east of Kalimaruk waterhole, and Kalookoli near the headwaters of the Kamaler River. There

are water-bearing stretches where wells can be dug which yield water throughout the dry season in two of the east-west flowing rivers, the Nakabosan and the Kamaler Rivers, and in the north-south flowing Korinyang River. However, in years of low rainfall the flow into these wells may be so slow that most of the animals grazing at Naroo must use the Turkwel River. The well areas of Lotongot and Lobokot used to be important water sources of animals grazing southern Naroo and also for animals grazing the Southern Central Mountain Range but have been abandoned because of Pokot attacks. Reopening these areas for use by South Turkana livestock could help to reduce livestock mortality in years of drought.

The Central Mountain Range is a chain of volcanic mountains and hills which stretches north and south through southern South Turkana. There is very little water in these highlands, but as the dry season progresses grazing is often better than on the plains particularly for cattle. In Naroo, Toma, and Nadikam there are stretches in the sandy rivers fed by these highlands where wells can be dug. However these are owned by the man who dug them, or his direct male descendants, and recharge very slowly during a prolonged dry season, so access to water is limited. Since the amount of water in the wells of rivers flowing from the Central Mountain Range is directly related to the amount of rainfall in the area, it is quite possible that the shortage of water is preventing overgrazing of this area.

Toma is the flat plain between the Central Mountain Range and the Highlands to the East of the Kalapata River. It is the region to which all our study herds returned in the 1981 rainy season. Water is generally available on the eastern slopes of the Central Mountain Range in the Kalapata and Nakwakaal Rivers, and in springs to the east of this region. Although there may be a long walk to water (up to 12 km each way) there is no part of this region which cannot be used by livestock because of lack of water.

Nadikam is an outwash plain lying between Kailongkol Mountain and the Kerio River. This is an important dry season grazing area for Ngisonyoka goats, sheep, and camels. There are very few wells in the rivers traversing this area, but water is available in the Kerio River, and at Lokwamosing and Lochoakula springs.

The area between Kalapata and the Kerio Rivers has numerous wells, and also salt springs which are good for camels. The volcanic plateaus and river courses provide dry season grazing for cattle and other livestock. However not many Ngisonyoka herders used this area during the 1980 to 1981 season because there was little grazing, and bandits were very active in the area.

The Loriu, a high volcanic plateau east of the Kerio River, is an important grazing area for Ngisonyoka cattle. Southwest of the Loriu is an area of alluvial fans and swamps, Ngibelai country, which Ngisonyoka herds sometimes pass through. The highland area to the southeast of the upper Kerio River has numerous water sources, and better dry season grazing, than do the plains areas. However, there is danger of raids by Pokot and by Turkana bandits.

The South Turkana keep five different species of livestock, camels, goats, sheep, cattle, and donkeys, each of which has different nutritional and water requirements. Our analysis of livestock movements in this region demonstrates that each herd complex, i.e. the livestock of an extended family,

is divided for at least part of the year into species-specific and production-specific herds. The Turkana are extremely nomadic: they have no permanent settlements, and each species-specific and production-specific herd has its own orbit of movement which varies from year to year and which sometimes overlaps with the orbits of other herds of the herd-complex, but often does not. Our data also suggest that the moves of Turkana livestock herds are the responses to environmental factors such as the nutritional needs of the different livestock species; the presence of disease and/or pests such as ticks; variations in the quality and quantity of water supplies; and variations in vegetation due in part to variations in topography and in soils and in part to the unpredictability of rainfall both in time and in space. The moves of Turkana livestock are also responses to social factors such as the presence of bandits, the threat of a GSU patrol, and the fear of raids by Pokot. This indigenous system of livestock management, which is extremely responsive to environmental variables, appears to be incompatible with any attempts to develop sedentary pastoralism, or to demarcate group ranches or grazing blocks.

The major awi is managed by the senior member of the extended family. When grazing is abundant and nutritious, all the livestock of a herd complex generally are in the major awi. As the dry season progresses, the species-specific herds split off and move to those areas where the water and fodder best suit the requirements of the particular species of livestock. During the rainy season, the major awis of all the six herd-complexes of the study group were clustered in the Central Plain. In the dry season, they were dispersed in Ngisonyoka territory.

The cattle are the first of the species-specific herds to split off from the major awi as the dry seasons begins. They move to highland areas, where grazing is more abundant. Cattle can migrate long distances--up to 40 km in one day.

The non-milking goat and sheep herds usually are the next to split off from the major awi. During the two observation years, they generally moved to the plains and hilly country in the southern section of the study area. The movements of the non-milking goat and sheep herds are restricted by the fact that small stock cannot walk as long distances to water as can camels and cattle.

The non-milking camels will sometimes split off from the major awi. They require browse and water of a high mineral content to maintain their condition, and the herd managers prefer to keep them on the plains rather than the mountains, because they are prone to falling and injuring themselves.

In the following section, we present the details of the movements of six Ngisonyoka herd complexes from the rainy season of 1979 to the rainy season of 1981. This shows the great diversity in the livestock management practices among different herders. These accounts describe the pattern of movement of each individual herd complex during each annual cycle, including some of the reasons for the decision to move camp.

Our study shows that the Ngisonyoka are truly nomadic. Although they do have a home area (ere) they do not have a particular place to which they return regularly, nor do they have fixed migration routes. They do not have field areas to which they return when it rains. A summary of movements of the herd complex for which we have the most reliable data gives an idea of the degree of Turkana nomadism. In the period from about March 1979 through October 1981

(30 months) the major awi of Lomaler moved about 233 kilometers, making a total of 16 major moves each averaging 15 kilometers. The cattle awi moved about 646 kilometers, making a total of 14 major moves, with an average distance of 46 kilometers per move. The non-milking goat herd had fewer independent major moves, because it was joined with the major awi for much of the year. However this awi had a large number of minor moves. Major treks (for example from the Central Plains to the Lochaokula area) often covered a period of several weeks with four to six stops along the way, since goats and sheep cannot walk long distances in a single day.

The distance which animals travelled to water has been calculated for those camps which we were able to locate accurately. By the end of the dry season, many camel herds had to go up to 15 km to water (a 30 km round trip), and we have one camp recorded as being 35.5 km from the spring where the camels drink. These camels were walking 76 kilometers every five days, in order to drink. Unexpectedly, we found that sometimes camels travel further to water during the rainy season than during the dry season. This is because browse is abundant along the route to water, and the animals are in good condition, so the herd managers can select the particular spring which he believes will provide the very best water for his animals.

We do not have as good data on the distance to water which cattle travelled, because they tended to use areas which we do not have accurately mapped. Our data indicate that a cattle awi seven or eight kilometers from water is not unusual. However, those grazing on Loritit Mountain at the end of the drought had to go much farther than that to water.

The major awis were generally located no more than four to six kilometers from water, though at the very end of the drought some goats and sheep had to travel up to eight or ten kilometers each way for water. This doubtless contributed to the poor condition of these animals, and the extremely high mortality (an overnight loss of up to one third of the animals) experienced in some herds with the chilling rains of March 1981.

Recommendations

Mobility is a strategy for coping with the unpredictable and sparse grazing resources of South Turkana. Any attempt to regulate South Turkana herd movements is not recommended, as this would almost certainly lead to greater livestock mortality in times of stress, and would be strongly resisted by South Turkana herders.

Mobile veterinary care at a cost which Turkana herders can afford is important for livestock development in South Turkana.

The Turkana are willing to sell livestock to buy posho. A regular, mobile market which also provides a regular supply of posho would help to develop a regular livestock trade. It is important that the Turkana receive a fair price for the sale of their animals. Important to the development of marketing is to have officials able to issue export certificates at Kapedo and Kainuk.

Although South Turkana have to travel long distances to water at the end of the dry season, it would not be cost effective to provide more water throughout the region. However, boreholes at specific sites (Lokwamosing, Lokosim a Ekor, Kochodin, Lopii, and Lokori) could be a health benefit to the people, and an aid in establishing administrative posts. The opening of Lotongot waterhole in the

southwest, and providing security there from Pokot attacks, would reopen a large area to Turkana herds.

Although it is an administrative problem, lack of security is a major obstacle in the development of the Turkana livestock industry, and therefore should be of concern to Veterinary Officers and Development Planners. Since the Turkana are so dispersed and so mobile, police stationed in towns cannot prevent raiding and banditry. Security can be established only by involving the Turkana themselves in the prevention of raiding and banditry.

- A. Convince the people that it is in their own best interests to cooperate with the Government to catch the bandits.
- B. Reward those Turkana who report bandits, and those police who effectively follow up on those reports.
- C. Try to find alternative activities for young men who have no livestock.
- D. The training of Turkana home guards to protect the waterholes and awis from banditry.

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