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Traditional Range Condition and Trend Assessment: Lessons from Pokot and Il Chamus Pastoralists of Kenya

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INTRODUCTION

There is increasing evidence that one of the main causes of failures of conventional approach to pastoral developments is the tendency to ignore the "local" or "traditional" knowledge, simply defined as knowledge that is unique to a given culture or society. This has led many people to argue that in order to ensure more socially, ecologically and economically sound developments, it is necessary to understand, respect and utilize local knowledge systems. However, these knowledge systems are not yet familiar to many 'professionals' working among the pastoralists.

Tadingar (1994) extensively argued that, "African pastoralists have an extensive knowledge of the major environmental components and their relations to rangeland productivity and their own survival. They know the ecological associations and interrelations between climate and land resources at their disposal." He concluded that these traditional experiences, skills and strategies are complementary to modern scientific knowledge and can be carefully studied and integrated into development schemes."

After more than six decades of development activities in the arid and semi-arid lands of Africa, solutions to problems of economic stagnation and environmental degradation are still elusive. Some of the reasons ascribed to the failure of development in these areas include inappropriate technologies, inappropriate or incomplete research, and lack of or inappropriate management Niamir, 1990). This realization has led some development agents to propose a closer linkage between traditional agricultural systems and modern scientific technologies. They argue that a combination of formal science and local knowledge or technology sharing, may be an effective development approach as it can increase the extension agent's and development worker's sensitivity to local needs, and stimulate meaningful dialogue between all participants in the development process.

Although the African pastoralist's traditional knowledge has been the subject of academic research for a long time, it is only recently that its potential role in development has been accorded serious consideration. Understanding of this knowledge system in Eastern Africa is rapidly increasing, especially in the fields of veterinary medicine and livestock husbandry, although still limited in the area of natural resource management (Niamir, 1994).

Munyua et al. (1998) reported extensive ethnoveterinary knowledge, including management strategies to reduce reproductive wastage among the Kenyan pastoralists. Similarly, Mogoa and Nyangito (1999) reported immense reliance on medicinal plants and indigenous practices in animal disease prophylaxis and treatment among the pastoral communities of Kenya. In Tanzania, Ole-Lengisugi (1994) reported that the Maasai have a rich empirical diversity of ethnosciences dealing with ethnobotany, ethnopharmacy, ethnotoxicity, therapeutics and ethnoprophylaxis. He observed that through such elaborate indigenous knowledge, the Maasai have developed elaborate animal health delivery systems, including diagnostic and therapeutic skills.

Farah (1996) documented a sound indigenous technical knowledge in natural resource management among the pastoralists of Kenya's northeastern province. In the same region, Oba (1994) reported existence of extensive environmental knowledge and land use tactics among the Rendille and Ariaal nomadic pastoralists, which ensure their survival in very precarious environments. In the same area, Noor et al. (1999) reported that the Somali and the Borana of Moyale District, practice herd splitting as a risk-spreading and inbreeding control strategy that eliminates bad traits within their herds. In southwestern Uganda, Kyagaba and Farah (1996) reported the use of frequent fires to regenerate pasture growth by the Bahima community, while in Tanzania, Mwilawa (1996) found that the Maasai and the Gogo use traditional grazing reserve system to preserve

pasture for use during droughts.

Until recently, pastoralists and agro-pastoralists, and their livestock seemed to have attained a dynamic equilibrium with their environment. Pressure on rangeland resources seldom reached a point where conservation measures were necessary. However, much has changed within the last few decades with human and livestock populations greatly increasing, and more of the most productive grazing lands being alienated for other uses, such as agriculture. Pressure from increased cultivation, overstocking, felling of trees for fuel and other resource use methods, which are predominantly 'extractive' in nature, is currently very high. Consequently, most rangelands in the district have deteriorated, making it increasingly difficult for the rangelands to support the rapidly growing and more sedentary populations (Meyerhoff, 1991; Herlocker, 1999). In recognition of the role that traditional knowledge can play in the management of natural resources for sustainable development, this baseline survey was conducted to document the traditional methods used by the Pokot and Il Chamus of Baringo District, Kenya to assess and monitor the condition and trend of their grazing lands. The specific objectives included identification of the main indigenous range condition assessment and monitoring techniques used by the two communities as well as the traditional adaptive survival tactics.

STUDY AREA AND METHODS

Study Area

The study was conducted between July 2001 and March 2002 in the semi-arid reaches of Baringo District of Kenya, the home of the East-Pokot and the Il Chamus communities (Fig. 1) (Herlocker, 1994). The area covers the rangelands to the northeast of the district, occupied mostly by the Pokot and the southeastern part, inhabited by the Il Chamus. It falls within agro-climatic zones IV and V, at an average altitude of 900-1200m above sea level. Climate is generally hot and dry (22º-24ºC). Rainfall is low, erratic and unreliable both in space and time - 300-700mm and bimodal in distribution (Pratt and Gywnne, 1977; Meyerhoff, 1991). Meyerhoff (1991) described the study area as open *Acacia/ Combretum* wooded grassland. Livestock production is the principal land use economic activity in the area, although there are isolated pockets of cultivable land.

The People

Several agropastoral and pastoral communities such as the Nandi, Tugen, Pokot, Elgeyo Marakwet and Kipsigis are found in the Rift Valley Province. The East-Pokot ethnic group inhabits the flatter north and northeastern rangelands of Baringo District. The community exhibits traditional subsistence economy that is purely pastoral, majority of its members being semi-nomadic, herding cattle, small stock, and sometimes donkeys and camels on communally owned land. In this community, livestock are kept for a wide variety of reasons. Besides the provision of meat and milk for subsistence, hides and skins for the household use, livestock have important social and ceremonial roles (Meyerhoff, 1991). Unlike other animals, donkeys are used as pack animals.

The Il Chamus, also known as Njemps, form a relatively small population (roughly 11,800 people), confined to an area of approximately 648km2 (GoK, 2001). The high population density in the Il Chamus territory has resulted in serious land degradation, especially in the Njemps flats, thereby lowering land productivity and the living standards of the locals (Meyerhoff, 1991). The Il Chamus occupy the lowlands around Lake Baringo to the south and east of Baringo District. This community and the Maasai are culturally one in almost every respect save for the dialect difference. They are generally less pastoral than the Pokot; practicing some dryland and irrigated agriculture, but still relying, to a larger extent, on their livestock for subsistence and livelihood (Meyerhoff, 1991). Despite the introduction of Perkera Irrigation Scheme within their territory, the Il Chamus living near the fields still hold onto their pastoral ideals and are relatively uninfluenced by the development changes.

METHODS

Data collection procedures included interviews, focused group discussions and guided transect walks. In a purposeful systematic sampling manner, a total of 50 and 53 key informants from the Pokot and Il Chamus communities, respectively, were interviewed on broad issues

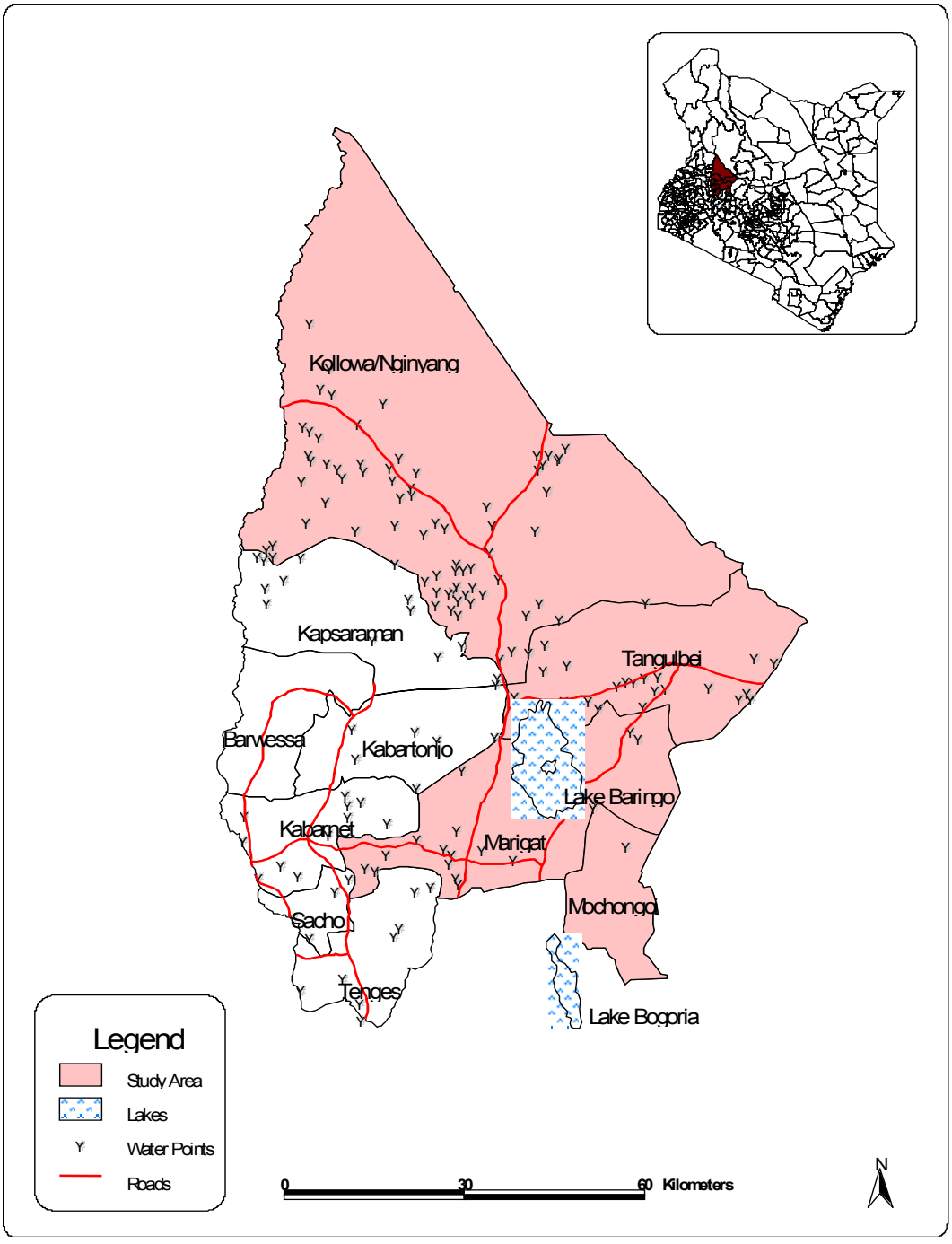

Fig. 1. Geographical location of Baringo District (Study Area)

related to indigenous range resource management techniques. An open-ended questionnaire was used to establish prevailing traditional techniques used by members of each community to assess and monitor range condition. Specifically, informants were asked to list and/or describe, 1) the factors ('indicators') they use to evaluate suitability of a particular range for livestock grazing; 2) the methods they apply in evaluating or rating the condition of the range; and 3) the measures they take when the condition of particular range was deemed too poor for grazing and livestock had to be moved to another area. The individual interviews were complemented by group discussions with the key informants to verify the information from the individual informants.

Data collected through the questionnaire were subjected to descriptive statistical analysis. The rest of the data were summarized to describe different techniques used in assessing and monitoring vegetation, soil, water and animal performance and the mitigation measures taken if the status of a given resource is undesirable.

RESULTS

The results of this study demonstrated that the Pokot and Il Chamus, like other pastoralists, have a very intimate traditional/cultural attachment to the land and its related resources. Over time, they have acquired important techniques that assist them track changes in their geophysical environment; as well as survive the vagaries of the said environment. On the basis of elaborate vegetation (ecological) and livestock knowledge, important day-to-day management decisions are made; potential carrying capacity is approximated. There are, obviously, some similarities and differences between these two communities. The similarities are probably because these communities share the same home range, and therefore have a lot in common in terms of ecological experience with the range ecosystem. Each community is discussed separately below in terms of its local knowledge system in relation to range condition and trend assessment.

THE POKOT

Rangeland Classification

The Pokot classify the range into two broad categories—the highlands (*masop*) and lowlands (*keu*). These divisions are mainly based on topography, climate and soil types. On the basis of physiognomic vegetation types, these two ecological categories are further subdivided into grasslands (*kurosus*) and bushlands (*kurosoko*), which they regard as suitable for grazers and browsers, respectively. The *masop* are lands found at higher altitudes than, and with vegetation types different from, the *keu*; they are characterized by black sticky soils as opposed to red loamy soils found in the *keu*. The Pokot perceive the *masop* as a cold place (*kornyo kakit*), which they regard as 'not good for livestock.' Conversely, they refer to *keu* as a warm place (*kornyo layat*), which 'likes the animal' (*kornyo chameitich*). The *masop*, as opposed to the *keu*, which are dominated by *Acacia* species, are normally composed of *Commiphora* trees as the dominant species. Other species include *Terminalia* sp. (*koloswo*) and *Dodonea viscosa* (*tapolokwa*). The *keu,* which are preferred for livestock grazing, are characterized by different grass and woody species such as *Aristida adscensionis* (*chelwowis*), *Eragrostis superba* (*chaya*), *Cynodon plectostachyus* (*seretion)*, *Setaria verticellata* (*amerkwia*), *Acacia tortilis* (*ses*), *A. mellifera* (*talamong*)*, Boscia salicifolia* (*likwon*)*, Boscia coriacea* (*sorichon*) *Salvadora persica* (*ashokonyon*) and *Balanites aegyptiaca* (*Tuyunwo*).

Ethnobotany

The Pokot perceive the knowledge of botanical composition of the vegetation to be of particular importance in evaluating range suitability for livestock grazing. The knowledge mainly focuses on the knowledge of plants, dietary requirements of different animal species; preferred forage species; poisonous plant species and medicinal plants. Knowledge of plants is perhaps the most refined; they have local names for nearly all plants found in their area.

The Pokot recognize that different animal species have different feeding habits and prefer different plant life forms. Cattle and sheep, which are grazers, prefer grassland while goats and camels, which are browsers, prefer bushland. They are able to identify the preferred forage

species; they distinguish between those that fatten livestock and improve their condition, for example, *Cynodon plectostachyus* and *Eragrostis superba*, and those that are good for milk production, for example, *Pennisetum meziunum* (*amarkuation*) and *Echinochloa haploclada* (*amaranyon*). The herders are also able to identify poisonous plants, for example, *Tribulus terrestris* (*asikuruyon*) and *tumon*. Through such knowledge herders are able to tell whether a given range is suitable for their herds or not. This is done through regular monitoring and judging of the changes in key plant species composition. The responses from the informants revealed that they have a rich knowledge of plants with medicinal and other values. Some of those with medicinal value include *Zanthoxylum chalybeum (songowo)*, *Albizia anthelmintica* (*mukutan*), *Salvadora persica* (*asokonyon*).

The community is aware that certain grass species like *Eragrostis superba, Chloris gayana (amerkuan)* and *Hyparrenia rufa (puresongolion*) have either decreased in abundance or disappeared. The members of the community agreed that there has been a general disappearance of perennial grasses and increased bush encroachment, thereby forcing them to keep more goats (browsers) than before.

With reference to measures taken by the herders when they realize that changes in plant species composition have made the range unsuitable for livestock grazing, 52% indicated that they change the direction of grazing, while 48% opt to scout for and move to better pastures.

Range Condition and Trend Assessment

The Pokot regard animal body condition, productivity and health as perfect reflections of the range condition. They evaluate range condition on the basis of overall animal performance (rumen-fill, coat condition, milk production, weight gain, animal health, mating frequency) and ecological factors (forage availability, distance to water, disease incidences, parasite infestation, security). However, the suitability of range for grazing is evaluated on the basis of ecological factors only. Table 1 presents the attributes considered by the Pokot while evaluating range condition and range suitability for grazing, respectively.

While overall animal performance is ranked first as an indicator in evaluation of range condition, rumen-fill comes first as an indicator of whether a pasture is overgrazed or not. Until considerable reduction in rumen-fill is observed, a pasture is not declared overgrazed. However, the decision to move from a poor to a better pasture is always arrived at after considering both animal performance in the current pasture and ecological factors in the next pasture. Satisfactory animal performance and favourable ecological conditions are regarded as indicative of a good range, the reverse being true for a poor range. The pastoralists use changes observed in the attributes shown in Table 1 to monitor range condition trend. Improvement in animal performance, increases in forage production, reduced distance to water, reduced disease incidences and reduced parasite infestations are taken as indicators of an upward range condition trend. The reverse is true for a downward trend. The Pokot argue that there is no excellent range, since during the wet season when there is plenty of forage and water, a lot of milk and increased birth rates; there are also high incidences of disease, heavy infestation of parasites and many predators. The range suitability ratings were given as good, fair and poor, depending on the status of the ecological factors (Table 2).

Table 1: Factors used by the Pokot in assessing range condition and suitability for grazing in order of importance respectively (n=50)

Attribute	*Range condition*	
	Attribute rank	*Grazing suitability ranking of attributes*
Animal performance	1	–
Forage availability	2	1
Distance to water	3	2
Disease incidences/ parasite infestation	4	3
Security	5	4

The Pokot pastoralists do not agree on the measures taken when a pasture is poor or overgrazed (Table 3). Some scout for and move to better pastures; others burn the pasture in order to regenerate growth and kill parasites such as fleas, ticks and lice; while others split their herds so as to spread the grazing pressure on the range.

Table 2: Range grazing suitability rating by the Pokot

Condition	*Ecological attributes*
Good	Adequate forage, short distance to water, and rare disease incidences
Fair	Adequate forage, short distance to water, and many disease incidences
Poor	Inadequate forage, long distance to water/ lack of water, many disease incidences, and many predators

Table 3: Decisions made when pasture is perceived to be poor or overgrazed

Decision	*Respondents (%)*
Scout for and move to better pastures	56
Burn pasture	28
Split herds	16

THE IL CHAMUS

Rangeland Classification

The Il Chamus also classify the range into two main categories, namely, highlands (*supuko*) and lowlands (*ilpurkel*). Depending on the dominant plant life forms, they further subdivide these categories into grasslands (*ngonjin'gngelen'g*) and bushland (*ngonjine-timbene*), where *ngujit* refers to grass while *mbene* means browse. They describe *supuko* as a hilly and cold place, characterized by black loamy soils. The common woody species in the highlands include *Albizia anthelmintica* (*mukutani*), *Terminalia* species (*ilbugoi*) and *Ficus thornningii* (*elngaboli*); the grasses include *Cenchrus ciliaris* (*loiupub)* and *Cymbopogon* species (*ilgurume*). The *supuko* is associated with a number of deadly diseases, and therefore considered not very good for livestock. In contrast, i*lpurkel* is known to be a warm place, which is good for livestock. *Ilpurkel* are low-lying areas characterized by red clay and sandy soils. The common grass species found in the lowlands are *Cynodon plectostachyus* (*longeri*)*, lamara,* and annual herbs such as *lote* and *lameruaki*, browse species include *Acacia mellifera, A. tortilis, Salvadora persica, A. reficiens* and *Balanites aegyptiaca*.

Ethnobotany

Knowledge of plant species (names, relative abundance, where they grow and potential forage value) is also vital among the Il Chamus stockowners; it is used for range grazing suitability assessment. They are able to tell the key perennial grass species such as *Cynodon plectostachyus, Cechrus ciliaris* (*lokorengok*) and *Chloris gayana* (*ilperesi*), which are preferred for milk production; annuals like *Tribulus terrestris* (*lameruaki)*; and key browse species, like *Indigofera spinosa* (*atula*)*, Balanites aegyptiaca* and *Acacia tortilis*. They identify poisonous plant species, for example, *Datura stramineum* (*ildule*) and *Tribulus terrestris*, which cause indigestion and bloat in animals. Regarding alternative measures taken by the herders to avoid the undesirable plant species, 57% of the participants said that they change direction of grazing while the rest (43%) indicated that they scouting for and move to better pastures.

According to the Il Chamus, the quality of pasture is always reflected in animal performance. They mainly rely on animal cues to identify palatable plant species. The animals 'lead' the herder to areas of preferred forage species. Animals select and spend more time on palatable species than on unpalatable species.

Range Condition and Trend Assessment

As among the Pokot, range suitability for grazing among the Il Chamus is evaluated on the basis of ecological factors (forage and water availability, disease incidences, parasite infestation and presence of predators) (Table 4). However, it is agreed that range condition is directly reflected in animal performance (full rumen, high milk production, rapid weight gain, high mating frequency, good health). The reverse is true for a poor pasture. Therefore, while they monitor the trend of range condition by assessing animal performance and ecological factors, most (54%) of the Il Chamus use animal performance as the primary factor in evaluating range condition. They regard rumen-fill as a decisive feature indicating whether a pasture is overgrazed or not. As long as the animals continue to show a full rumen, they do not consider the particular pastures as overgrazed.

According to the Il Chamus, a full rumen at the close of the day is a sign of a good range. Similarly, increase in milk production, rapid weight gain, abundance of forage, and water

Table 4: Factors considered by the Il Chamus in assessing range suitability for grazing in order of importance respectively (*n*=53)

Attribute	*Rank for attributes*	*Rank for grazing suitability*
Animal performance	1	—
Plant vigour	2	—
Forage availability	2	2
Distance to water	3	1
Disease incidences/	4	3
parasite infestation	5	4
Security		
Topography/Accessibility	5	4

availability indicate an upward trend in range condition. When forage is inadequate, animals show signs of dissatisfaction. For instance, reluctance to return home early, and once at home, the tendency to graze at night. A drop in milk production is indicative of both poor range and poor animal health. Animal unrest during milking and kicking of the calf also indicate dissatisfaction. The herders also agreed that an unhealthy herd implies poor range. Presence of biting flies and other parasites, which causes animals to be restless, and consequently, a drop in milk production, are also indicators of poor range condition. Pastoralists are also familiar with the fact that stony, slippery, steep and rugged areas are only accessible to goats, but not cattle and sheep, and that a good range is one that is accessible to livestock. Predators like lion and leopards are a security threat and areas in which they are present are not thought as being good range and are therefore avoided. They rate range suitability for grazing as good, fair or poor (Table 5).

Majority (64%) of the Il Chamus scout for and move to greener pastures as one of measures taken when pasture is too poor or overgrazed. However, some (28%) use fire to regenerate pasture growth and reduce parasite infestation. The rest (8%) split their livestock into herds, which are grazed on different pastures to ease the grazing pressure on the range.

DISCUSSIONS AND CONCLUSIONS

It is evident that the Pokot and Il Chamus pastoralists have a sound knowledge and understanding of their environment. This body of indigenous technical knowledge forms the basis for local-level decision-making pertaining

Table 5: Ecological rating of range suitability for livestock grazing by the Il Chamus

Condition	*Ecological indicators*
Good	Adequate forage, short distance to water, rare disease incidences, rare predators, accessible
Fair	Adequate forage, long distance to water, few disease incidences, few predators, less accessible
Poor	Inadequate forage, very long distance to water, many disease incidences, many predators, poor accessibility

to natural resource management, food security and a host of other vital activities of pastoralists. The eco-physiognomic classification of the range used by the Pokot and the Il Chamus communities is closely comparable to that used in conventional range science. They use climatic factors, topography, dominant plant species and soil type. They know that areas with different soils, topography and climate have different vegetation types, which in turn, support different animal species depending on their dietary requirements. The areas also respond differently to different management practices. This criterion is similar to that used by the Ariaal (Oba, 1994), who also classify range into highlands and lowlands, which are perceived to be different in topography, climate, soil and vegetation types. Based on these eco-physiognomic classes, the pastoralists are able to make decisions pertaining to range suitability for a given livestock species. The pastoralists further sub-divide these broad range types into grasslands and bushlands, referring to dominance of grass and browse species respectively, which are preferred by cattle (grazers) and goats (browsers) respectively.

As opposed to the modern range scientists, who closely link the knowledge of plant species composition to vegetation succession and the climax concept as used to explain range condition rating, this study reveals that pastoralists perceive the knowledge of plants *per se,* their botanical composition and nutritive quality in more practically applicable and interpretable terms. They use such knowledge in evaluating range suitability for livestock grazing. These findings are in agreement with those of Sindiga (1994) and Makokha et al. (1999), who reported that the Maasai and the Pokot have an extensive knowledge of range plants and are able to identify species that are preferred by livestock and those that are undesirable. However, the

pastoralists depend primarily on animal wisdom and cues to make certain judgments as those pertaining to forage palatability, where the decision on the direction of grazing relies on the animals, which lead the herders to areas of palatable and preferred forage species.

The Pokot and the Il Chamus monitor animal performance through regular assessment of animal body condition, productivity and health. These indicators are known by the pastoralists to be sensitive to ecological and biological changes. This approach of evaluating animal performance is comparable to that used by the Rendille, Ariaal and Samburu as reported by Oba (1994).

As observed by Farah (1996), the intimate knowledge of the environment, common to many pastoralists allows a great flexibility in decision-making and an enhanced ability to utilize all resources available. The findings of this study reveal that traditional assessment and monitoring of grazing resources is, to a great extent, dependent on the concept of spatial and temporal heterogeneity of rangelands, where the use of pasture by livestock is designed in a way that ensures use of different ecological sites at the peak of their forage production. The use of pasture by livestock is monitored and balanced with the productivity and potential of the ecosystem, therefore occasioning grazing movements which are aimed at achieving optimum use of different ecological niches. Unlike the conventional approach, indigenous range management takes into account the daily variability and spatial heterogeneity at the micro-level when matching range potential to livestock use.

It is also evident that the pastoralists concentrate their management efforts to key sites such as dry season grazing reserves (swamps and hills) and areas with special palatable species. The beneficial effects of management of such small, but crucial sites are believed to eventually trickle down to the larger ecosystem.

In contrast to conventional range science, where evaluation of range condition is almost entirely based on the plant and soil attributes—plant vigour, plant species composition, plant and litter cover, and erodability—animal performance (rumen-fill, coat condition, weight gain, milk production, health, mating frequency/ birth rate) is the main focus of assessing range condition among pastoralists. However, while the decision to move from a given pasture to another is dependent on animal performance in the current pasture, the choice on the next pasture depends on its ecological condition. These findings concur with those of Oba (1994), who reported the same kind of approach to evaluation of the range among the Rendille, Ariaal and Samburu of northern Kenya. The Pokot and the Il Chamus consider rumen-fill as a decisive feature for telling whether pasture is overgrazed or not. As long as the animals still show full rumen, they do not consider pastures overgrazed. However, over-reliance on rumen-fill as an indicator of range condition could sometimes result in misleading judgments; an animal's rumen could be full, sometimes, regardless of obvious observable ecological deterioration.

It is evident from the results of this study that most of the indigenous techniques and practices are acceptable and similar in approach to modern techniques. It is, therefore, as much as possible, necessary to integrate indigenous resource management practices with conventional techniques. This has the potential of improving the effectiveness, acceptability and success of development initiatives that are aimed at improving food security and livelihood of pastoralists and other rural communities. In pastoral development planning, recognition of the traditional knowledge and practices, not only restores the confidence of pastoralists in their own knowledge and skills, but also reflects a willingness to consider particular problems at grass-root level. While it is important not to romanticize indigenous knowledge, there is an urgent need to bridge the gap between the local and modern knowledge systems, while appreciating the fact that not all indigenous techniques are beneficial to sustainable development of local communities and not all traditional practices provide solutions to local problems.

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KEY WORDS Indigenous. Technical Knowledge. Range Condition and Trend. Range Resource Management. Il Chamus. Pokot. Kenya

ABSTRACT This paper provides the results of a case study of some traditional range management methods of the Pokot and Il Chamus pastoralists of northwestern Kenya. The study focused on the factors used in monitoring and evaluating range condition and range condition trend, and seasonal range suitability to grazing by these communities. It is clear that these pastoralists have an intimate traditional and cultural attachment to resources at their disposal. They have, over time, devised techniques that ensure their survival under the highly vagarious environments; they are cognizant of changes and correlations in their rangelands, but may not understand causality. The study demonstrates that there are fundamental differences in the way these pastoral communities monitor and assess rangelands, compared to the western-oriented range scientists. For instance, pastoralists use livestock performance and ecological parameters as important indicators of range condition, while range scientists use plants. The results of this study support the theory of complementarity of modern scientific knowledge and traditional pastoral knowledge in pastoral development.

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