

Indigenous Technical Knowledge for Resource Monitoring in Northern Kenya

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ABSTRACT This study, which was undertaken in the Northern Kenya pastoral community, was aimed at documenting the various indicators the community use in monitoring the quality of range resources, especially vegetation. It should be noted that livestock production is the main livelihood system in this communities. Data was captured using interviews and focused group discussions with a section of the community members. The study revealed a wealth of knowledge in monitoring of the range resources quality within these communities. Among the two communities, it was evident that they observe livestock behavior, livestock attributes and physical phenomena, as indicators of vegetation quality. Livestock behavior observed could tell when the range conditions were suitable for livestock and when the conditions were unsuitable. Goats' being playful is a common characteristic that indicates that the range conditions are suitable for livestock. Other observable livestock behavior or attributes indicating good range conditions are livestock responding to their names when called; increase on milk out put; increased mating. Indicators of bad range conditions include: - rough hair on camels; livestock grinding teeth at night; high mice populations; increase in camel flies. Some specific observations are specific to few individuals. This is in the case of judging the suitability of forage by smelling livestock urine. However these indicators are used to make decisions always when the community migrates from one region to another in search of pastures. Documenting this indigenous knowledge aids in better understanding the reasons behind the decisions made for livestock migration.

INTRODUCTION

In Africa, local communities had well-developed traditional indigenous knowledge systems for environmental management and coping strategies, making them more resilient to environmental change. Studies by Kamara (2004) indicate that this knowledge had, and still has, a high degree of acceptability amongst the majority of populations in which it has been preserved. These communities can easily identify with this knowledge and it facilitates their understanding of certain modern scientific concepts for environmental management

Globally, there is increasing acknowledgement of the relevance of indigenous knowledge as an invaluable and underused knowledge reservoir, which presents developing countries, particularly Africa, with a powerful asset in environmental conservation. From time immemorial, natural resources conservation and management in Africa has been deeply rooted in local communities, which apply and use indigenous knowledge to master and monitor

climate and other natural systems and establish early warning indicators for their own benefit and future generations. Indigenous knowledge is therefore an essential element in the development process and the livelihoods of many local communities.

What is Indigenous Knowledge?

According to Warren (1987), indigenous knowledge is local knowledge that is unique to a given culture or society. Rajasekaran (1993) notes that indigenous knowledge is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments, and intimate understanding of the environment in a given culture. According to Haverkort (1993), indigenous knowledge is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies. Local people, including farmers, landless laborers, women, rural artisans, and livestock rearers, are the custodians of indigenous knowledge systems. Moreover, Butler and Waud (1990) notes that these people are well informed about their own situations, their resources, what works and doesn't work, and how one change impacts other parts of their system

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Value of Indigenous Knowledge

Warren (1991) notes that indigenous knowledge is dynamic, changing through indigenous mechanisms of creativity and innovativeness as well as through contact with other local and international knowledge systems. These knowledge systems may appear simple to outsiders but they represent mechanisms to ensure minimal livelihoods for local people. According to Warren (1987), indigenous knowledge systems often are elaborate, and they are adapted to local cultural and environmental conditions. This observation was also made by Pretty and Sandbrook (1991). They also noted that indigenous knowledge systems are tuned to the needs of local people and the quality and quantity of available resources. They pertain to various cultural norms, social roles, or physical conditions and their efficiency lies in the capacity to adapt to changing circumstances. According to Norgaard (1984): Traditional knowledge has been viewed as part of a romantic past, as the major obstacle to development, as a necessary starting point, and as a critical component of a cultural alternative to modernization. Only very rarely, however, is traditional knowledge treated as knowledge *per se* in the mainstream of the agricultural development and environmental management literature, as knowledge that contributes to our understanding of agricultural production and the maintenance and use of environmental systems.

A study was undertaken among the Gabbra and Samburu pastoral community in Kenya with the specific objective of discussing with the community and documenting the various indicators they use in monitoring the range resources. The output of this exercise was intended to help in setting up of a community based range resources monitoring unit, which was to be run by the community and the results compared with the conventional methods on agreed time scales.

Background of Study Area

Marsabit district is located in the extreme northern part of Kenya. Most of the district is covered by extensive plains (530 – 760m a.s.l) interrupted by mountain ranges. The plains generally fall under the arid to very arid classification with high temperatures (above

30°C an average), low rainfall (less than 200 mm/year) and poor soils and occupies about 97% of the district. The main economic and social activity is nomadic pastoralism. The pastoral ethnic groups found within the district are the Samburu, Rendille, Gabbra, Desanach and Borana. All this ethnic groups are rich in traditional knowledge, which they have used over many generations to suit the environment. They have sustainably exploited the natural resources for generations and controlled overexploitation with the aid of this knowledge, entrenched within the traditional institutions.

STUDY METHODOLOGY

Interviews and focused group discussions with the community members were used in capturing data. Meetings were organized within the community, and all people invited. A total of 35 community members attended the meetings. However, the discussions were focused on the older members (men and women) of the community, who are presumed to have a wealth of traditional knowledge. Participants were allowed to deliberate on the various issues and experiences and document their agreements.

RESULTS AND DISCUSSIONS

Traditional Pastoralists Methods of Rangeland Quality and Trend Assessment: The traditional methods used by these pastoralists in assessing range condition and trend are subjected to the primary goal of increased livestock production, which is their core means of livelihood, and not necessarily on the integrity of the physical environment. Seasonal migrations are done to opportunistically take advantage of pastures produced by the erratic rainfall in space and time.

Traditional Methods of Rangeland Quality and Trend Assessment Among the Gabbra Community: Among this community observable livestock behavior is used in monitoring rangeland conditions more than physical observations of the environment. It is recognized within this district that this area has the fattest camels, goats and sheep, yet from the physical observation of the environment there may not be so much forage in terms of quantity. This indicates that the community recognizes forage quality more than quantity. The following are some of

the ways the community uses to judge range quality and trends.

Observable Livestock Behavior

1. In areas with good forage conditions, the livestock will come straight into the boma after grazing in the evenings, but in areas with bad forage conditions they will want to look for other pastures even after coming back to the bomas in the evenings. This indicates that they are not satisfied with the pasture quality, even if the quantity was enough.

2. In good forage conditions the livestock will snore at night when they sleep.

3. In good forage conditions all livestock species are playful, and dull in situations when the conditions are not favorable. This is a behavior observed any time of the day.

4. When livestock are heard grinding their teeth in the evenings or at night after grazing, it is believed that the range condition is bad.

5. Forage species quality is determined by looking at the soil type of the area. It is believed that white soils produce high quality pastures, while brown soils produce relatively low quality pastures. This indicator is specifically used in determining forage quality for camels.

6. Increased livestock mating is a sign of good range conditions. It was noted that in areas with poor range conditions, there is low mating and hence the livestock population is small. As observed by the participants this may be in areas of high vegetation cover but with few pasture species that are desirable for increased livestock production.

7. Livestock take a lot of water in good range conditions, but in bad range conditions the amount of water taken is little. This may be correlated with the quality and quantity of forage eaten.

Among this community every individual among the various livestock species is given a name, apart from the sheep that are called by one name, the number of the livestock not withstanding. In good range conditions, when they call their livestock by their names they respond. But in conditions when the range is not good, the animals do not respond and sometimes even refuse their calves to suckle.

Observable Livestock Condition

1. Livestock produces more milk in good

rangeland conditions. This does not necessarily mean good pastures but also water and sometimes minerals. The milk is also observed to have foam but in poor range conditions the milk is 'watery'. This may be related to the quality of pastures and water and presence of salt licks.

2. Livestock droppings especially for cattle, are soft with good forage conditions and hard with bad range conditions or poor forage species.

3. Observed poor body condition score is an indicator that the range condition is poor. They say that the livestock body is 'drying up'; hence need to shift to another place. In areas of good range conditions, there is a rapid gain in livestock body weight, even with reduced or declining vegetation cover.

4. Camel urine is observed to stick to their tails and legs when the range conditions are good. Without this the range is said to be poor or not good at all and may not be good for camels.

5. Rough hair on the camels is an indication of bad range conditions.

Observable Physical Attributes

1. Water quality for livestock is determined by how much the livestock drink often. Too little water taken shows that the water is not desirable to the livestock hence it is of low quality. Too much water taken per time indicates that it is of high quality.

2. Increase in the population of camel flies on livestock is an indication that the range conditions of that area are not good.

3. Areas of good range conditions have high hyenas population. The good range condition may be associated with good forages and may be water. The hyenas may like such areas since they have to predate on livestock and other wildlife especially browsers and grazers that would prefer this areas.

4. High mice populations show the range conditions are poor.

5. Increased soil erosion in areas of desirable forage species is also a strong indicator of declining range conditions. Soil erosion was not a very serious problem since the land was fairly flat.

6. Decline in desirable forage species. Many forage species that were once in this area can only be found in the Hurri hills and the adjacent areas. Also some species have declined greatly, e.g. *Salvadora persica*. This is attributed to

overgrazing or over browsing by livestock, increased settlements and also demand made on the vegetation for building materials. Other key indicator species are *Indigofera spp* and *Acacia tortilis* along the riverine systems.

7. Specific soil and vegetation characteristics. When, for instance, a Borana or Gabbra herdsman says: *Lafti tunini chiisa hori gabdi*, he literally says that the place is so favorable to the livestock that they cannot stop lying on it. By this he means that the soil is so favorable that even when there is not much pasture on it, the livestock will like it so much that they will continue to gain weight and yield large quantities of milk. According to Oba (1982), a grazing area that has no *chiisa* is not favored for grazing, even when it has plenty of vegetation, and such areas are often avoided. But areas with *chiisa* are often favored even when they have little pasture.

Not every kind of livestock that they keep favors parts of the range that they occupy; they favor only certain parts. These parts are correlated with the availability of the desired food species and soils. For example, Gabbra camels are not browsers like the Somali camels; they feed on dwarf shrubs such as *Indigofera spinosa* (*qorati gala*) and grass. But even areas with such desired plant species are not yet suitable to be used by camels unless they have adequate *gangalimo* soil baths. Therefore camels do not like range areas with lava, which have no soil baths. Other areas, such as red (*Wayama*) soil with thick bushes, are also not favored because they harbor tsetse and other biting flies. But areas of chalky soil (*boji*), have abundant *gangalimo* – and are thus highly favored. On the other hand goats and sheep do not like such dusty areas, but favor such areas as lava, which have dwarf shrubs and annual grass.

The participants observed that all the above methods are qualitative and not quantitative. This requires keenness in observations made and takes time to acquire such information. A change in the above observation is what the community uses to determine range condition and trends. For example, in times past there were areas in which livestock were observed to be playful during grazing, but presently that observation is not any more. From their perspective this indicates that the area has deteriorated. The present socio-cultural set-up in which the young people go to school, many people work outside

the pastoral areas, increased sedentarization and alternative livelihood systems, has made this knowledge of 'less impact' in the pastoral society livestock production systems. Some of the young participants acknowledged that they didn't know or did not have the above information and could not apply or make the above observations on the livestock. This shows a great shift in the socio-cultural patterns within the pastoral community and hence a need to try blending the traditional and conventional knowledge base.

Traditional Methods of Rangeland Quality and Trend Assessment Among the Samburu Community: Unlike the Gabbra community, the Samburu/Rendille community observes both the physical phenomena and livestock behavior. These observations may be because of the unique microclimate of the area i.e. the area receives a higher amount of rainfall and the surrounding mountains have forests with a high vegetation biodiversity that may influence livestock management practices.

Observable Physical Phenomena

1. Physical observation of the area by sending out scouts to check vegetation performance and species desirable to livestock. This is done after the rains. The areas that have better forage species in terms of cover are preferred.

2. The invasion/presence of *Duosperma eremophyllum* shrub in this area is an indicator of declining range conditions. This species is said to cause diarrhea in small stock during the rains and increase the worm load in livestock species. However during the very dry seasons all livestock species browse it since there are few available vegetation species. In the areas where it grows, no grasses can grow i.e. it smothers grasses, while in plots where it has been cleared the grass biomass is high.

Apart from being a source of forage, this species is also beneficial in that it reduces water flow speed during the rainy seasons hence checks on soil erosion. Though the community noted that it has greatly reduced the cover of grasses and other perennial shrubs, the shrub should not be removed. This was because it helps reduce soil erosion and its removal may expose the soil to erosion affecting the range even further. They noted that methods or plant species should be introduced that would smother it at the same time provide forage to livestock.

3. There has been an increase in bush cover in areas where there were grasses before. It was noted that areas near the mountains were covered with grasses and few trees. As an example, *Cordia sinensis* shrub has greatly increased in Ngurunit area, a species that was not there before. This spread may be attributed to the monkeys who very much feed on the fruits. With the increase in bush cover, grazing land has greatly reduced. On the mountain areas, hardly 5 km from the settlements, there is high cover of grass species growing. Abundant grass species included *Enterepogon macrostychus*, *Cenchrus ciliaris* and *Eragrostis superba*. This may be an indicator that grass used to grow on these lower slopes.

4. Increased gully erosion, especially near the mountain areas and near settlements. This was unlike before when the soil was more intact. The increased gully erosion is said to be due to animal trampling and cutting of vegetation and also in some places where people have settled. The eroded places hardly grow any vegetation.

5. Increased settlements have reduced the number of desirable vegetation species and vegetation cover i.e. there has been species change due to human settlements increase. Apart from cutting the vegetation resources for building and fencing materials, burning charcoal, fuel wood and other uses, the space taken by settlements is said to have increased tremendously over the years. This has been in the areas where there was desirable vegetation species with high cover. This area is continuing to deteriorate as the population increases and more people settle.

6. Reduced water levels/flow. The community observed that as late as 1960's the Ngurunit River used to flow from the adjacent mountains to the villages that are 7km away throughout out the year but nowadays it hardly flows downstream one month after the rains. It was noted that just after the rains the water subsides very fast. The great reduction in the water levels has caused the population in this area to get their water further upstream the mountain areas. The further they move into the mountain areas, the greater the negative impact on the natural resources. The decrease in the water levels is attributed to the deteriorating vegetation conditions in the water catchment areas on the mountain. The increased incidences of Cedar tree logging for poles and forest fires caused by honey harvesters has

greatly reduced the vegetation cover in the forest. The community also noted that increased harvesting of rocks and sand from the riverbed has greatly reduced water percolation and much water is lost through run off.

7. The increase of saltlicks within the area. There were many salt licks, which were preserved and only used by livestock during specific seasons. The livestock use to graze other areas and only came to Ngurunit mountain areas when forage was scarce. This was the time when the salt licks were utilized. With increased sedentarization and increase in livestock numbers around settlements, many salt licks have been exploited. Access and control of these salt licks is not well defined as in times past when specific seasons were designated for use of the salt licks.

8. Increase in worm load in their livestock. Though they noted that salt licks have increased within the area acting as a source of livestock minerals, the worm load in their livestock has continued to be high. Areas with good range conditions are judged by reduced worm load in the livestock species. This is because the traditional practice of shifting the livestock boma (enclosures) has been neglected due to sedentarization. Shifting the boma aided in breaking the reproductive cycles of the worms. Another factor contributing to increase of worm loads in the depletion of salty bushes due to over browsing.

9. Certain forage species are linked to good range conditions and their absence to deteriorating range conditions. These are said to be very nutritious, increase milk yields and body weight, and also improve livestock health. These may be found singly or in association. These are *Acacia nubica*, *Acacia tortilis*, *Indigofera spp* and *Commiphora cardicula* (Samanderi). Species that are a major source of minerals are *Pennisetum stramineum* (Rparis), *Cadaba glandulosa* (Surus) and *Indigofera spp.* (Nkitagesi). On the contrary increased cover of poisonous plants like *Steganotaenia araliaceae* (Ldurle) and *Euphorbia spp* (Lparaai) reduce the value of the area.

10. In the recent times there has been an increase of polythene bags and waste papers in Ngurunit town and its environs. The participants observed that there have been high death rates of livestock because of eating this polythene bags. It was noted that with increased human

settlements and commercial activities this problem would increase in magnitude, affecting a larger area and making it unsuitable for livestock use. This is said to have greatly reduced the value of the range near the settlements.

Observable Livestock Attributes

1. The smell of livestock urine is used to judge the condition of the range. Though this was seen as very subjective, it was noted that specific smells would tell desirability of vegetation and water sources. The indicator is used by those who have long experience in livestock management, especially in the satellite camps (*fora*). There is a strong link between urine smell and specific forage species, water conditions and even soils.

2. High milk output from the livestock indicates that the range conditions are good. This, they noted, had to do with quality more than quantity of forage taken. It was noted that desirable forage species and water are necessary for increased milk production.

Observed Livestock Behavior

1. Livestock behavior is closely observed when moving from area to area in search of forage in the satellite camps. When goats and sheep are observed as playful all the time or run from place to place then it is an indication that the forage conditions are good, and hence they will take some time grazing their livestock in this area.

2. During the morning hours, the goats are closely observed to see if they wiggle their tails. If they wiggle their tails in the morning then it's an indication that the range conditions are good. The herders in the satellite camps make this observation.

3. Range conditions could also be judged as poor when livestock especially cattle are heard grinding their teeth at night.

The young participants, especially those that had formal education, noted that this information was new to them. They didn't have this knowledge and at the same time doubted if they could apply it. This was because they prefer a settled pastoral lifestyle than the nomadic lifestyle. With these changes in the socio-economics and hence value systems, it may not be feasible to promote all the traditional knowledge systems and institutions nor introduce

wholesome new approaches and institutions. This implies that there should be a compromise between the conventional and traditional indicators of range quality and trend.

CONCLUSION

Despite the continuous use of indigenous knowledge by local communities, it has not been harnessed into the current scientific framework for environmental conservation and natural disaster management in Kenya. However, globally there is awareness on the importance of this indigenous knowledge and its contribution to sustainable development. It is important to integrate or mainstream indigenous knowledge into scientific knowledge systems for sustainable development, especially in the drylands of Kenya. To achieve this integration would require a blend of approaches and methods from science and technology and from indigenous knowledge. This activity is a step forward towards this direction.

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