Indigenous Rangelands Monitoring: harnessing pastoralist knowledge in the Horn of Africa

- **Rangelands development and extension services should build on pastoral indigenous rangelands knowledge**
- **Pastoral rangeland management capacity can be strengthened through support to customary institutions**
- **Local and global monitoring of rangelands degradation should use local knowledge to verify larger-scale data sets**

In Eastern Africa, and perhaps more widely, there is a disconnect between rangelands science and pastoralist rangelands management. The challenge is partly one of different knowledge systems and a failure of scientists and practitioners to communicate effectively with the other. Pastoralists and rangeland scientists have plenty to offer each other, but what is often missing is mutual respect and understanding and the necessary means for bringing the two knowledge systems together. Range scientists tend to monitor rangelands at relatively fine scales, whereas herders tend to operate at multiple scales. Range scientists recommend manipulation of stocking rates in accordance with localised range condition, whereas herders practice seasonal herd movements to routinely modify grazing pressure between landscapes and between seasons. These approaches are not mutually exclusive, but they illustrate different monitoring systems based on different objectives.[1]

A space for traditional rangeland management

Since the 1990s pastoral development approaches in eastern Africa have improved, due partly to increased support for livestock mobility, customary institutions, and pastoral livestock strategies, and partly to a greater emphasis on human development and rights based approaches. The building blocks for pastoral development, notably empowerment and governance, are now better understood and addressed, but there remains a major gap in understanding, at a practical level, of how pastoralists manage their natural resource base. Development projects have enabled pastoral communities to strengthen their tenure over rangeland resources, and to restore traditional management practices, but projects often lack the capacity to help pastoralists to benefit from scientific advances in rangeland management.

Standard range management advice applied during the livestock development projects of the 1970s and 1980s has been widely discredited: particularly advice to reduce mobility and to restrict livestock numbers (Sandford 1983; Thebaud 1990). These failed rangelands and livestock development projects have left a legacy of no-confidence in range science which may now hamper pastoral development. However, there is a risk in placing too much faith in the rangeland management capacities of pastoralists and it is important to understand not only the extent, but also the limitations of pastoral indigenous knowledge. What is needed is a more nuanced approach to rangelands development based on complementarity between two different knowledge systems.

Pastoralists require support to make informed choices over the techniques and technologies they adopt and science needs to relate to indigenous knowledge and must be incorporated into local governance frameworks. Advisors don't need prescriptions to tell pastoralists what to do: they need a methodology through which they can understand local knowledge and work with pastoralists to use this knowledge to make sense and use of new science and technology.

[1] This briefing note outlines the principle findings of a study carried out for the World Initiative for Sustainable Pastoralism. The study was funded by the Food and Agriculture Organisation of the United Nations. The original study was conducted by Professor Gufu Oba, Department of international Environment and Development Studies, Norwegian University of Life sciences. The full report can be accessed at www.iucn.org/wisp/

How pastoralists monitor their rangelands

Monitoring rangelands at different scales

In general, range scientists use tools for monitoring at a fine scale whilst pastoralists monitor rangelands at multiple scales, defined in terms of space and time. Pastoral management is carried out between different agro-ecological zones, and also more locally within a landscape. Spatial management and monitoring includes political landscapes, which the communities negotiate in order to respond to variable rainfall and risks of droughts, for example to access resources outside the traditional resource borders or cross international Frontiers.

The three pastoral communities in this study used comparable systems of land classification at regional and local scales. At the regional scales the grazing lands were categorized into key and non-key grazing resources separated by topographic variations that marked seasonal livestock grazing movements (i.e. between wet, dry and drought periods). Herder range scouts, referred to as *abuuru*, *iddo* and *ngikerebo* by the Orma, the Afar and the Karimojong respectively, conduct grazing assessments for directing livestock grazing movements during different seasons. The systems of assessments are influenced by the dominant livestock species: cattle for the Orma and Karimojong and camels for the Afar. Key grazing landscapes differ according to local ecology: for the Orma and the Afar the key dry season and drought grazing landscapes are the riverine floodplains, while the Karimojong use marshes and mountains. Uplands are used by the Afar in the wet season and by the Karimojong in dry seasons.

Inferring range condition from livestock performance

Range scientists aim to improve forage conditions and trends by adjusting stocking rates according to plant-based indicators at different scales: from small patches measured in metres squared to larger landscapes measured in square kilometres. By assessing response to grazing pressures, ecologists predict which plant species are more or less sensitive to grazing pressure and therefore are likely to diminish or proliferate in over-utilized areas.

By comparison, herders infer the relationships between plant production and livestock grazing using livestock performances. Inferential indicators (i.e. anthropogenic indicators) are not directly measured but are the outcomes of management and are deduced based on the perceptions of herders. Whereas ecologists would use the indicators to understand conditions of pasture, the herders would use anthropogenic indicators to assess grazing suitability for different livestock species during different seasons of grazing. Herders used a range of value-laden indicators to assess grazing suitability at local and landscape levels.

Basing judgement on past experience

Herders use their knowledge of the past for understanding environmental changes in the present, for example to determine livestock movements in response to environmental uncertainty. Historically climate, management and epidemics determined the state of grazing landscapes, which in turn determined herd movements. These events are used by herders to analyse environmental changes and impacts of droughts on livelihood coping strategies.

Herder management of rangelands is determined not only by changing seasons and drought periods, but also by social events and rituals and political forces. Despite social institutions for resource co-management between groups, new and shifting frontiers can create ecological and social barriers to effective rangelands management. Conflicts along these resource frontiers

Fine-scale indicators of the Orma

The Orma characterize grazing landscapes according to their soils and vegetation and categorize them according to livestock grazing suitability classes (low, medium and high) during different seasons. Symbolically these are described as the hump (*dhaallu*) and the breast or rump (*andaaraaf*) to describe the fat quality of the meat that they produce. Livestock are grazed in landscapes with red soils (*wayaama*) during the wet season and white-grey (*omaar*) soils during the dry season. The *omaar* landscapes and its vegetation are thought to be highly nutritious and the livestock that graze them keep their body condition even during stress periods. *Wayaama* soil is unsuitable for cattle management in the dry season, since livestock lose weight, but these soils produce forage rapidly after the early rains and livestock recover quickly from dry season nutritional stress. Grazing suitability is assessed according to species, with *omaar* soils (characterised by the presence of *Cordia* species or *madheera itile qaaya*) preferred for cattle and *wayaama* (associated with browse plants) better suited to small stock.

Landscape scale indicators of the Orma

The Orma recognize three types of pasture conditions resulting from different types of rainfall showers. The *koono* showers that fall in the dry season might initiate browse regeneration but be insufficient to induce the growth of grass and therefore do not lead to migration. The second type comes when heavy rainfall induces pasture growth and leaves surface water that is attractive for livestock migration if other conditions are equally acceptable. The third series of indicators are based on examination of livestock body condition and the behaviour, assuming livestock are already present in the surveyed rangelands. Favourable conditions are indicated by playful behaviour, increased bulling, cattle "night-sleeping" for long periods, chewing the cud, having a full rumen and displaying a lustrous coat. Finally, scouts assess settlement landscapes since every landscape has a history of settlements and decision making.

Reading camel behaviour

Afar herders report that camels "monitor their own physiological changes", for example seeking salty plants when they have the urge and travelling to landscapes where such plants are common. Herders read camel behaviour and respond to their changing preferences. Herders expressed the opinion that "camels and the herder communicate with each other…the camel might not talk but their behaviour is sufficient to influence herder decisions" and "a camel is a better expert of soils than the herder". Some soils are classified as either cold or warm and camels respond by either settling and chewing the cud, or becoming restless. Afar herders also assess suitability according to general body condition and changes in condition of body hair. Under favourable conditions, milk yields increase, the rumen fills and bull camels rut more aggressively and for longer.

Reading cattle behaviour

Cattle are the livestock of preference in Karamoja and herders are finely tuned to cattle behaviour as an indicator of rangelands condition. Herders assess body condition and cattle behaviour, particularly in the morning after overnight kraaling to infer the condition of the given site. In favourable locations, cattle tend to sleep for longer periods, milk yields increase, immature animals are playful and bulls mate more actively. The cattle's coat is more polished, the rumen is full in evening after grazing and in the morning, and general gains in body condition can usually be observed. As rangeland condition deteriorates, behaviours and condition reverse and productivity declines, at night cattle remain standing and become restless, the herd moving about in the kraal.

The role of scouts

Ngikerebo scouts in Karamoja consider a variety of rangeland indicators which are grouped according to grazing availability, water availability, and availability of fencing materials for the mobile cattle camps. The status of pasture is assessed in terms of plant growth: early regeneration (*eparat echalichal*) after initial rainfall showers; maturing and flowering stages of grasses (*kelebat*) and; standing dry hay (*athakan*). Incidences of diseases are investigated, as well as local security. The *ngikerebo* look for footprints of people they suspect as cattle rustlers. If other herds already occupied the grazing area, the scouts would determine existing livestock stocking density based on the number of kraals in relation to available grazing and water sources.

Ngikerebo consider the condition of the grazing landscapes, classified by soil and vegetation indicators. The major landscape categories for the Matheniko grazing lands are *arro* (black cotton soils) and *eketela* (sandy loam uplands and the plains) that are extensively distributed. Other landscapes include *asinyonoit*, with sandy soil and high diversity of woody species, and *angromit*, featuring pebbles and small stones spread on the ground surface often mixed with soils of various colours. Based on the types of soils and vegetation indicators the *ngikerebo* categorize the landscapes into different seasons of grazing. The knowledge of soils and vegetation is used to assess livestock production performances.

can intensify during periods of drought and have altered the pattern of land use across sites such as Afar in Ethiopia (resources split between Ethiopia, Eritrea and Djibouti) and Karamoja in Uganda (resources periodically shared between the Matheniko of Uganda and the Turkana of Kenya).

Transmitting experience through folklore

Pastoral land management is often expressed in folklore: Orma cattle folklore (*darma*) describes watering and grazing movements in different landscapes as well as between water sources; Afar camel lore (*gaala silale baaro*) describes grazing, breeding and calving; Karimojong folklore uses personalized ox-names to express responses to changing environmental conditions. Folklore is the medium through which the societal values and the needs of livestock are expressed, which in turn defines social norms.

Hot and cold soils

Herders from different societies used the notion of hot and cold soils to make inferences about grazing suitability, but such indicators need careful interpretation. Karimojong herders perceive that for the same landscape there are “hot” and “cold” patches during the night. Warm patches are said to “breathe out hot air” at night and tended to be too warm and unsuitable for night kraaling. These areas are also associated with livestock and human diseases but the link remains unclear and further validation is required.

The management strategy of the Karimojong differed from that of the Afar and the Orma who described cold rather than hot soil as undesirable for night kraaling. The difference might depend on the fineness of observation between warm and cold soils. However, in all three cases, herders would investigate the phenomenon by moving about the kraal at night and feeling the soil surface for heat in various spots to reach conclusions over site suitability. More detailed observation is required to interpret the rationale of this form of monitoring and to identify scientific explanations or parallels.

Monitoring degradation

Among the three communities grazing lands are classified according to soil differences and assessment is based on livestock grazing suitability, determined for example according to animal behaviour, milk yields and production performances. Scouts also combine soil and vegetation indicators for rating grazing suitability of different livestock species and for categorizing landscapes according to their potential for grazing. Landscapes with high potential have greater stocking potential and resist grazing pressure, while those with low potential are at risk of degradation.

The three societies use comparable criteria for regulating grazing between different landscapes. Herders categorize rangelands on degradation vulnerability scales and results showed that areas of the rangelands in Orma and Afar are deteriorating. Grazing suitability indicators and the corresponding livestock production indicators for both sites point to deterioration of the rangelands. Heavy grazing pressure and degradation can be identified, particularly in areas affected by expansion of invasive species (in particular *Prosopis*) and by loss of floodplain pastures to commercial farming (in the Orma and the Afar sites). By contrast, the Karamoja site shows favourable grazing conditions, generally good rangeland health, and the absence of either the invasive species or significant commercial farming.

Monitoring degradation in Afar

The Afar refer to severe levels of land degradation as *aboroiti baaro*, or areas that are bare of herbaceous cover. Landscapes where herbaceous cover has been replaced by *Prosopis* species are also referred to as *aboroiti baaro*, while the presence of dry litter and standing grass hay were classified as *kafiin isoole baaro* and highly productive landscapes are called *andarhaarra*. Researchers using these scales found ecological and anthropogenic indicators of degradation at landscape scales. Each landscape type has key woody and herbaceous species and local scouts suggest that different landscapes are associated with specific plants species that when present serve as indicators of rangeland grazing and the stability of range condition. According to Afar scouts, degraded rangelands had lost the key forage species and would therefore have no value for livestock grazing.

Monitoring degradation in Karamoja

In Karamoja, change in plant species composition indicates adverse land use changes, while the landscapes with no changes demonstrate stability. The Karimojong have terms for describing the gradients of grazing pressure from heavily grazed (*adedeu*), moderately grazed (*erekeny*) to ungrazed (*adakar amoore*). Karimojong consider *eketela* (sandy landscapes) to be more vulnerable to heavy grazing than *arro* (black soil) landscapes. *Arro* landscapes have greater potential for resisting heavy livestock grazing and recovering rapidly after grazing and are usually grazed during the dry season or drought year, while the more sensitive *eketela* is grazed principally during the wet season. Continuous grazing of *eketela* would result in severe degradation that would take longer periods to recover.

Enforcing management decisions

The three societies have local (indigenous) institutions for regulating grazing and making society-wide decisions on resource management and drought response. The Orma use the council assembly of *jarsa mata dedha*, which traditionally had wide-ranging powers for making critical decisions using customary law for settling disputes, controlling grazing movements and negotiating access to external grazing resources with the neighbours. The Afar *Makabantu* (*makaban* pl.) is the clan based institution that has functions for coordinating grazing, negotiating with neighbours for gaining access to their resources during periods of droughts and defending the clan in times of conflicts. Karimojong indigenous institutions function at two levels: at the sub-section level, the Karimojong rely on ritual leaders for making

decisions on livestock grazing movements at regional scales; at the settlement levels they have senior elder councils *(kathiko*) that are responsible for making decisions. Decisions are made by the elders of the traditional settlements (*ngireria*) on matters of livestock migration as well as protecting the community against raids or responding to droughts.

Recommendations

Rangelands development and extension services can be built on pastoral indigenous rangelands knowledge

Rangeland scientists need to understand existing rangelands management practices before proposing alternatives, or identifying improvements. Participatory approaches have been widely used for over 20 years, but extension agents often struggle to adjust their skills to the demands of an effective participatory framework. Guidelines and training are required to enable extension workers to support pastoralists to identify indicators for rangelands monitoring and to use these as the basis for developing rangelands management skills.

Pastoral rangeland management capacity can be strengthened through support to customary institutions

Government can support indigenous range management knowledge by acknowledging the indigenous systems of land use and supporting community empowerment. Governments need to acknowledge and respect traditional systems of resource use and provide tenure security for key resources. With appropriate consultative fora, Governments could also draw on indigenous rangelands knowledge to improve decision making on investment priorities and for mobilizing local communities as partners in development planning.

Monitoring of rangelands degradation, locally and globally, should use local knowledge to ground truth large-scale data sets

Governments often lack insight into the true extent of rangelands degradation, relying on imprecise satellite imagery with limited ground truthing. Governments can greatly strengthen their capacity to monitor rangelands condition and trends by establishing appropriate relationships with local communities, for example as part of a broader process of legitimising customary institutions.

Conclusions

Indigenous range management knowledge appears to be comparable to conventional range management, although they differ in their emphasis. This study observed remarkable consistency between communities and the methodology now needs to be further tested in a wider range of environments, including outside of Africa. A wider range of studies would enable more detailed analysis of generalized principles of indigenous knowledge, if they exist, and could provide a foundation for global applications of the knowledge across varied cultures.

Pastoral Indigenous Rangelands Knowledge can be harnessed to transform the way government and other agencies provide support to pastoralists. The underlying principles are not different to those for sustainable development in any context: understand and respect local ways of doing things before presuming to know a better way. Rangeland scientists will need support, both to relate their knowledge system to that of pastoralists and also to adopt more participatory ways of operating. In principle however, no major inconsistency between the two knowledge systems has been identified. The major challenges that still have to be overcome are the weaknesses in legal tenure and management rights for many pastoralists, a low capacity for communication between pastoralists and rangeland scientists, and low investment in public services such as rangeland extension.

Losing institutions

As Islam gained a foothold in Eastern Africa, the *gada* institution of the Orma weakened and was abandoned after the last office holders of the *abba gada* (Godana Jaara) and the *hayu* (Buya Guyo) died. After abandoning the old institution, the Orma ran into difficulties because they lacked a functional system for managing their affairs. Islam was not a substitute to the *gada* and it did not present the Orma with an alternative system of resource management and coordination, grazing regulation, or of resolving internal and external conflicts. The Orma therefore elevated another institution, called the *jaarsa mata dedha*, which previously functioned under the guidelines of the *gada* laws, to coordinate grazing. This institution received support from the British administration under indirect rule.

For more information, visit http://www.iucn.org/wisp/resources/