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GUEST EDITORIAL

African Rangelands and Pastoralism in a changing continent: Perspectives and Opportunities

A special issue in celebration of the United Nations designated International Year of Rangelands and Pastoralists in 2026

Eighty-five years ago, Africa was described as a land of promise because it provided an immense opportunity for maximum return in the minimum time (Olaniyan 2000). It was treated this way because it was considered more for its deposits of natural wealth and less for its potential for settlement or as a destination market for goods and services produced in Europe and elsewhere (Le Clair 1937). For over 50 years, this narrative held ground but in the last 20 years, perception has shifted with Africa becoming a destination market and a growth opportunity creator, whilst holding ground as a resource provider (Sy 2016). These externally driven perceptions are shifting how key natural resources on the continent are viewed, used and managed. Accordingly, contestations are emerging especially around the environmental–demographic realities. This is because of the emphasis currently placed on continuous economic growth requiring more resource inputs. This will ultimately lead to increased natural resources conflict (Abbink 2018).

The exploitative narrative over Africa had become pervasive with respect to the categorisation and valuation of its natural resources. Accordingly, despite covering 43% of the continent's land surface, rangelands have been subjected to a relatively negative narrative being described as undeveloped areas (Kratli 2010), and centers of degradation, erosion, desertification, droughts, famine and conflict (Martínez-Valderrama and Ibáñez 2023; Twinomuhangi et al. 2023). Such negative narratives influenced the kinds of intervention in rangelands, confining these large swaths of land to conservation areas such as national parks and game reserves (Jones 2006; Cavanagh et al. 2020), constraining livestock to species such as goats (Doro 2023), and expropriating lands from the Indigenous Peoples (Homewood et al. 2009; Guyo 2017). However, more recently, ecologists and economists have revisited the place of rangelands in the continent to provide alternative perspectives on the importance of these natural resources (Vetter 2013).

Current evidence counteracts previous notions that African rangelands and pastoralism are unproductive and mismanaged systems (Liniger and Studer 2019). The contribution of rangelands to the livelihoods of African people is considerable and diverse. Most of the continent's livestock providing diverse products including meat and milk produced from the rangelands (Holechek et al. 2017). Additionally, rangelands are increasingly recognised for their diverse role in the provision of ecosystem services (Ruvuga et al. 2019; Gatwaza and Wang 2023), including carbon sequestration (Denboba 2022) and other valuable provisions. As the population in Africa has grown rapidly over the last three decades and is projected to reach 2.5 billion people by 2050, food demand has also grown and will continue to rise (Dorin 2017). Rangelands have often been the frontiers for agricultural expansion and urban development, and land use conversion pressure is higher in existing rangelands, often with high population densities (Schlecht et al. 2020). Such patterns of land use change are causing inflexibility and restricting livestock mobility in traditional rangeland use centred around livestock herding (Feldt et al. 2020). Owing to these pressures, land tenure and land use policy, including land privatisation (Godde et al. 2020), sedentarisation, and conversion to other land uses, have become increasingly prevalent in the rangelands (Byakagaba et al. 2018). These changes are reorienting the livelihoods of the people domiciled in many African rangeland areas. Increasing global connections via trade and investment are leading to improved better infrastructure and increased accessibility of previously remote rangelands, thereby contributing to large-scale transformations of the traditional territories of rangeland-based people (Lind et al. 2020).

Following the increasing global recognition of the momentous dynamics that are globally reshaping rangelands and biodiversity, the Government of Mongolia proposed in 2019 that the United Nations (UN) declare an International Year of Rangelands and Pastoralists (IYRP) in 2026. This proposal was subsequently endorsed by the United Nations Food and Agriculture Organisation (FAO) and approved by the United Nations General Assembly on 15 March 2022. The intention of celebrating the IYRP is to raise the profile of rangelands and pastoral societies worldwide and to enhance recognition of their valuable contribution to the economy, environment, society, and culture at a the local, national, and global level. Under the global IYRP coalition, African researchers decided to develop a special issue of the African Journal of Range & Forage Science to provide evidence on diverse topical issues converging around the theme rangelands and pastoralism in a changing continent. This African-led special issue presents emerging evidence for a regional perspective of dynamics that are reshaping the perception, valuation, development, and management of the continent's rangelands.

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What the papers report

The ten papers included in this special issue demonstrate the multiple facets of rangelands and pastoralism, ranging from spatiotemporal changes in rangeland dynamics (Arena et al. 2023; Mlaza et al. 2023; Momberg et al. 2023), pastoralists' indigenous knowledge (Finca et al. 2023: Nyambali et al. 2023) and rangeland management innovations and policy (Anane et al. 2023; Maguraushe et al. 2023; Mwamidi et al. 2023; Scholtz et al. 2023; Timpong-Jones et al. 2023).

Spatiotemporal changes in rangeland dynamics

Arena et al. (2023) reported that the Eastern Karoo region in South Africa has become significantly grassier and more productive since the mid-20th century. This change was attributed to increased rainfall and a reduction in livestock numbers over the study period. Increasing grass cover has benefits for livestock production, but also increased fuel loads, particularly in lower-lying plains where fire disturbance is historically uncommon. Therefore, whilst increased grass cover provides a valuable forage resource to pastoralists' herds, there is also the increased concern about the future risks and ecological implications of increasing fire frequency.

Mlaza et al. (2023) reported on the ecological interactions in the Eastern Cape of South Africa, showing an overall decrease in soil mineral concentration (N, P, Ca, Cu and Zn) with degradation, except for soil Ca and K. All serum samples collected during the dry period from severely degraded rangelands had a mineral status (except for Fe) below the critical levels. This may be related to the low quality and quantity of nutrient intake by livestock. The patchy characteristic of key soil nutrient distributions should be considered when planning restoration of degraded rangelands, at least for priority and immediate responses. Localised nutrient-rich areas may form an important nutrient source for regeneration of plant communities and seed banks.

Momberg et al. (2023) conducted a meta-analysis to ascertain the effect of kraals (corrals or bomas) used by pastoralists to confine livestock overnight or for longer periods and to protect them from predation, on soil nutrients. They demonstrated that the associated nutrient (C, N, P and K) hotspots with increased pH persist over time and occur broadly, i.e. across biomes and continents. Nutrient hotspots left by kraals are known to increase N, P and K in forage, which attracts domestic and wild ungulates. Kraaling over an excessive area or time may result in soil characteristics outside of the local ecological bounds. Therefore, if used judiciously, short-duration kraaling may have substantial potential as a cost-effective rangeland restoration tool.

These three studies on changes in rangeland condition consider the role of rainfall, stocking rate, kraaling in changes in rangeland condition. Whilst the papers show the positive increase in range condition due to these drivers, Mlaza et al. (2023) outline the negative impact of land degradation on soil mineral concentrations and concomitant nutrient deficiencies in cattle. These studies point out the opportunities to adapt herd composition and management to changes in vegetation and soil condition and to use this information to inform restoration and livestock nutrition.

Pastoralists' indigenous knowledge

Finca et al. (2023) reported a case study, which found that communal farmers from the Eastern Cape in South Africa have in-depth indigenous and spatial knowledge about the management and changes in condition of their rangelands. However, because of ageing communal farmers, limited youth participation, and declines in agricultural extension services, this knowledge is increasingly not being incorporated to ensure effective communal rangeland management. There also appeared to be a breakdown in knowledge transfer, which dissuades young people from participating in livestock farming, and has negative consequences for sustainable use of communal rangelands.

Concomitantly, Nyambali et al. (2023) showed that feed shortages are the biggest challenge in terms of cattle production amongst smallholder farmers in semi-arid rangeland dominated by a mixture of grasses, shrubs and encroaching leguminous trees. By using local knowledge and modern science, they identified the availability and nutritional value to local forages. Whilst natural pasture grasses and crop resident were important fodder for livestock, the nutritional value of *Vachellia karroo* was the highest.

Both these studies outline that there is great value in indigenous knowledge and opportunities exist to use this knowledge to improve rangeland and livestock farming. Finca et al. (2023) highlight the opportunity for agricultural extension to assist with the knowledge flow amongst communal farmers and aid in the generational transfer of indigenous knowledge. Both these two studies embrace the use of new technologies and modern science that farmers can either incorporate into their indigenous knowledge and training or to identify the potential forages for cattle feeding in free-range beef farming.

Rangeland management innovations and policy

Anane et al. (2023) demonstrated the value of the integration of Geostatistics and Geographical Information Systems with conventional vegetation field surveys for estimating dry matter yield and grazing capacity of under-surveyed savanna rangelands in Ghana. The results obtained on the spatial variation in herbage yield, species composition and grazing capacities would be of value to inform local livestock production improvement strategies. Livestock production from extensive savanna rangelands contribute to the livelihoods of millions of rural dwellers in the region. Given the accuracy of the data using this methodology, authors see the opportunity to expand this research to provide a holistic understanding on the health and production efficiencies of savanna rangelands in the region for ruminant livestock production.

Maguraushe et al. (2023) argued that assessments of livestock production systems on African rangelands must not be limited to purely economic parameters. For example, goats have other significant functions in communal areas, such as manure and milk production, which are not incorporated in the current goat production efficiency (GPE) formulae. This may have resulted in the underestimation of the value of goats to rural communities. Considering all the benefits of keeping goats and increased production parameters in woody plant encroached rangelands, e.g. use of *Vachellia karroo* trees as animal

fodder, the authors argue for a paradigm shift in viewing encroached rangelands.

Mwamidi et al. (2023) observed that in the Mwanda–Marungu Pastoral Commons in East Africa, having a community with a deep connection to their territory through historical, religious, and landscape-scale ecosystem services, the local community has legitimate authority to safeguard and reinforce rules and norms that govern their area and all its members to ensure that their land is protected. This seems to be essential for guaranteeing sustainability of natural resources, such as pasture, water, biodiversity, and wild animals, as well as cultural aspects attached to landscape elements. These are crucial attributes that conform to the IUCN's Other Effective Area-Based Conservation Measures (OECMs).

Scholtz et al. (2023) investigated the broad perception that ruminants produce large quantities of greenhouse gases which contribute to global warming, and that ruminant production is world's largest user of land. They recommend that improved productivity of beef production (and other ruminants) in southern Africa, resulting in a lower methane footprint, can be achieved through the use of adapted genotypes, alternative breeding objectives (to improve productivity and not merely production) and alternative production systems (e.g. crossbreeding).

Timpong-Jones et al. (2023) presented a review of transhumance between Economic Community of West African States (ECOWAS) member states. They reported that transhumant herds usually move from agro-ecologically vulnerable zones with limited vegetation cover towards areas with better range and water resources between or within the same country. Interactions between transhumance pastoralists and their hosts build social relationships but herder–farmer conflicts also occur. The member states adopted the regulations on transhumance, but several gaps need to be addressed to strengthen the policies and make their implementation more effective.

The studies highlighting rangeland management innovations, bring about different perspectives on how pastoral systems should be viewed that would provide greater clarity on the economic value of pastoralism, pastoralists' contribution to the conservation of biocultural diversity and to reduce methane emissions. These studies and Timpong-Jones et al (2023) point to the need for further research and review of current policies affecting pastoral areas.

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