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The role of pastoralists' indigenous knowledge in managing South African mesic and semi-arid rangelands

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Key words: Knowledge co-production; Rangeland management; Pastoralism

Abstract

Rangeland management decisions by pastoralists are largely based on experiences which include but not limited to ecological relationships, animal health and land use practice. Recent droughts have stretched the natural resources, management skills and the livelihoods of pastoralist to their utmost limits. The aim of this research was to gain a better understanding of how pastoralists in the semi-arid and mesic rangelands utilize indigenous knowledge in their rangeland management. Face-to-face interviews were conducted to establish how South African pastoralists incorporate indigenous knowledge in their rangeland management and monitoring. Data obtained from the interviews was analysed using content analysis. Insights that emerged from the analysis included categorizing the rangeland by using such as vegetation and livestock indicators. Vegetation indicators included plant colour, plant diversity and abundance; while livestock foraging time and livestock health were livestock indicators. In order to allow rangeland recovery, interviewed pastoralists in the mesic rangelands detailed to divide the rangeland into '*soet veld'* [characterised by palatable grasses that have low fibre content and maintain their nutrients in the leaves throughout the winter] and '*suur veld'* [characterised by unpalatable grasses that have high fibre content and tend to remove their nutrients from the leaves during winter], which are utilized by livestock during different seasons. In the semi-arid regions, pastoralists practice transhumance between different vegetation types; while allowing rangeland recovery in the grazed area. Pastoralists also explained to incorporate western scientific knowledge with their indigenous knowledge to modify their grazing practices in order to minimize overgrazing and rangeland degradation. Therefore, this study emphasizes that movement towards sustainable rangelands requires transdisciplinary methodologies for an improved understanding of pastoralists' knowledge and management practices of their local rangelands.

Introduction

South African rangelands cover approximately 80% of the country's land surface (DAFF 2018). A large portion of livestock farming in the country occurs in arid or semi-arid rangelands that are vulnerable to

climatic variability and climatic changes. Therefore, management of rangelands need to simultaneously consider the demands of various threats.

Pastoralism is an ancient livestock production system that was developed 7 000 years ago in response to long-term climatic changes (FAO 2018). Any decision by pastoralists is based on various knowledge which include ecological relationships, natural resource management, animal health and land use practice. According to Thomas et al. (2020), movement towards sustainable agricultural production is centred on an improved understanding of pastoralists' knowledge and learning processes. Insights on how a pastoralist understands their farming environment, and knowledge encounters between pastoralists are all crucial for pastoralists' knowledge assessment (Reed et al. 2010). Therefore, the aim of this study was to gain a better understanding of how South African pastoralists utilize indigenous knowledge in rangeland management.

Methods

This study engaged qualitative research focusing on multiple case studies, as described by Meredith (1998). Semi-structured interviews were used to investigate pastoralists' agro-ecological knowledge utilization in rangeland management. Pastoralists chosen for the study were goats, sheep and cattle herders. A total of 17 and 27 pastoralists from the mesic and semi-arid rangelands respectively formed part of this study. Mesic and semi-arid rangelands were represented by pastoralists from the Eastern Cape Province, and the Northern Cape Province in South Africa, respectively. Questions for the interviews were related to grazing lands utilization, and indicators used to monitor rangeland condition. Content analysis as described in Braun and Clarke (2012) was used to analyse data.

Results

Indicators used to monitor rangeland condition

Good rangeland: Grazing areas which visually appear to have a bright green colour were described as good rangeland condition in both study sites. Plant species such as *Pentzia incana*, *Limeum africanum* L. subsp. *africanum*, *Vachellia karroo*, Scutia myrtina, *Olea europaea* L. subsp. *cuspidat*e, *Portulaca oleracea*, *Themeda triandra*, *Cynonodon* sp., *Cenchrus clandestinus* and *Digitaria eriantha* were listed as indicators of good rangeland condition. Pastoralist emphasized the need for continued monitoring of such palatable plants to reduce degradation and overgrazing.

Poor rangeland: Pastoralists in the semi-arid rangelands explained that decreases in palatable shrubs such as *Didelta spinosa* and *Eriocephalus ericoides* indicate a poor grazing area. The high abundance of unpalatable shrubs such as *Tylecodon* sp., *Solanum elaeagnifolium*, *Opuntia aurantiaca* and *Euphorbia ferox* were listed as indicators of poor rangeland condition. One pastoralist reported to use foraging time as an indication of rangeland condition.

"*I usually let my animals out in the morning on their own without a herder, and they normally return to the homestead around 4pm. However, if this time passes and the livestock is not back, it is normally an indication that something is wrong or they have not eaten enough, meaning that the condition of the veld is bad. Then I either send out my herder to go and investigate the matter or I go myself*".

Use of indigenous knowledge in rangeland management

Pastoralists in the mesic rangelands described to improve rangeland condition by making use of livestock to spread *Themeda triandra* seeds through faecal matter. Pastoralists also described to alternate cattle grazing with goats and sheep grazing to utilize different grass heights in the rangelands. However, pastoralists emphasized the importance of continued monitoring for plant height to reduce root damage.

Livestock handling was described to be an important aspect of rangeland condition. A pastoralist in the mesic rangeland, detailed to have been taught by his father not to whip livestock, as this results in stress; and the livestock destroy vegetation and soil from running around haphazardly. Additionally, pastoralists in both study sites described limping to be an indication of poor rangeland condition with wet soil or ticks' presence.

Mobility between different vegetation types was described as an indigenous practice by the pastoralists. The semi-arid pastoralists use the Succulent Karoo as a winter grazing area, and the Nama Karoo is used as a summer grazing area. Similarly, pastoralists in the mesic rangelands move their livestock to graze on the soetveld in winter and move to the suurveld during the summer season.

Discussion

The use of palatable plant diversity as an indicator for rangeland condition is common amongst African herders (Samuels et al. 2018). The current study's results of the use of livestock behaviour to monitor rangeland condition, are concurrent with Dabasso et al. (2012).

Transhumance is practiced to exploit seasonal availability of natural resources (Ntombela et al. 2024); and forms part of ethnic identity across global indigenous communities (Blench 2001). The transhumance routes followed indicate a rich understanding of natural resource distribution and availability in the rangeland.

Pastoralists have over many years, accumulated and transferred indigenous knowledge; and it is from this knowledge that decisions are made. Therefore, knowledge and goals need to be integrated into rangeland management for increased and sustainable production. This requires expertise and methodology integration of social sciences into the rangeland profession. Research such as this current one could potentially add to the agricultural education sector of South Africa to highlight the value of agro-ecological knowledge in livestock production and rangeland management, leading to knowledge co-production.

Acknowledgements

We would like to acknowledge the pastoralists of the Eastern Cape Province and the Northern Cape Province, for participating in this study. This research was approved by the Humanities and Social Sciences Research Ethics Committee at the University of the Western Cape (Reference number: HS23/10/58)

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