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“Reconcile land system changes
with planetary health”

Big tree, big impact- how we can use trees to maintain rangelands’ forage provision

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Abstract

Arid and semi-arid rangelands cover a large proportion of Africa and sustain millions of people. Despite their importance, rangelands often face heavy degradation due to unsustainable use by people and livestock and increasing weather extremes. Traditional large-scale seasonal migratory movement has long been a sustainable land use strategy but is restricted by various political constraints and land fragmentation. Seasonal recovery periods help to maintain forage provision under heavy disturbance, yet rangelands rested during the dry season benefit less, requiring targeted management. Furthermore, it remains unclear, if seasonal migratory movement, in combination with traditional seasonal exclosures, reserved as forage reservoir for sick and young livestock, are a suitable approach under less reliable rainfall regimes.

We analysed how seasonal migratory movement on a small scale, i.e. communal rangeland, influences the herbaceous vegetation. We were interested in how sustainable the concept is under decreasing rainfall reliability, resulting in prolonged drought periods. We measured herbaceous vegetation cover and biomass in the three rangeland management areas, seasonal exclosures, dry season rangeland and rainy season rangeland during a growing period with below average rainfall. We compared the herbaceous vegetation in open rangeland and below tree canopies to disentangle the effect of herbivory and woody vegetation.

The herbaceous vegetation cover of our study plots was on average higher than 25 %. We found significantly higher herbaceous vegetation cover and biomass under trees, particularly under large trees. This trend more pronounced in open rangeland and most evident in rainy season rangelands. Herbaceous vegetation under trees in rainy season rangeland had higher percentage of grass, whereas in dry season rangeland and seasonal exclosures, we found more forbs under tree canopies.

While rainy season rangeland has been shown to be least resilient towards heavy disturbance, we showed that trees can be an efficient management tool to help maintaining vegetation cover and forage provision. The overall rather high vegetation cover might serve as one indicator for a healthy rangeland. Hence, we conclude that rangeland management following the principles of traditional seasonal migratory grazing can be a sustainable approach to sustain rangeland resources under low rainfall conditions, even on a local community scale.

Keywords: Forage provision, rangeland use, seasonal migratory movement, tree influence, vegetation cover

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