

Spatial Rangeland Utilization by Livestock of Maasai Pastoralists in Northern Tanzania



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Introduction

- Mobility promotes rangeland sustainability by distributing the grazing pressure throughout the landscape.
- increasing human population and livestock numbers together with climatic changes result in an increasing grazing pressure at local and landscape level
- Need to understand livestock utilization and movement patterns to minimize the negative interactions on the grazing land

Study Aim and Objective

- To gain deeper insights into how Maasai pastoralists are adapting to increasing pressures of land degradation, restricted land availability and climatic changes in the Enduimet region of northern Tanzania.
- To identify and characterize different grazing areas utilized during the year and associated rangeland management practices.

Methods

Data collection



GPS-Tracking („Catlog Gen2“ by Perthold Engineering Dallas, USA) of 7 cattle, 5 goats and 5 sheep with an capture interval time of 3 min, starting every day from 5am until 9 pm from Nov 2019 – March 2020



Household survey in 25 Households (=Boma) and 10 Key Informative Interviews (KII) using a semi structured questionnaire in ODK for data collection
+ 2 Participatory mapping sessions with each 12 participants



Data analysis

Grazing unit maps

- Georeferenced in QGIS 3.12
- Grazing areas digitized in polygon shape image files

Household survey and KII

- data from structured questions were analysed by using descriptive statistics
- Open end questions -> ranking the main emerging categories + extract key messages

Livestock movement patterns

- Calculating the daily walking distances (DwD) and the distance to Boma (DTB) by using the function 'distm' in the package 'geosphere' in R

Results

high variations in daily walking distance (DwD) across herds and across days

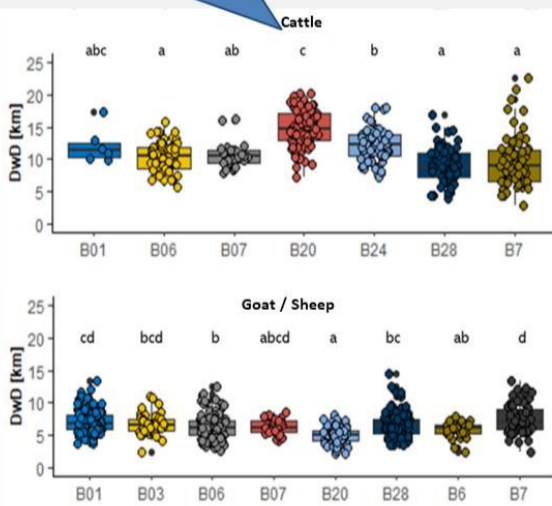


Figure 1- Daily walking distance (DwD) of 7 cattle and 8 goat/sheep herds in Enduimet from December 2019 to March 2020; the small letters indicate significant differences between the means using a Turkey's HSD test with $p \leq 0.05$

mean DwD 9.7 ± 0.5 km
mean maxD was 4.0 ± 0.1 km

> DwD showed no significant difference between months
> maxD significantly increased from December to March

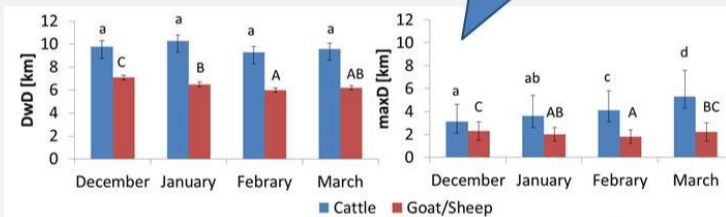


Figure 2- Daily walking distance (DwD) and maximum reached distance away from the homestead during the day (MaxD) of 7 GPS equipped cattle herds and 8 mixed goat/sheep herds in Enduimet, northern Tanzania, from December 2019 until March 2020. Small letters indicate significant differences of means between months using a Turkey's HSD test with $p \leq 0.05$

mean DwD 6.4 ± 0.5 km
mean maxD was 2.1 ± 0.1 km

> DwD of goats declined (8%) from December to February/March
> maxD of goat/sheep herds slightly decreased from December to February and then increased in March

Utilization of different grazing areas during the year

- set-aside during the dry season
- strategic seasonal movements to temporary bomas (Ronjos) in the high quality areas
- restricted grazing access to these areas

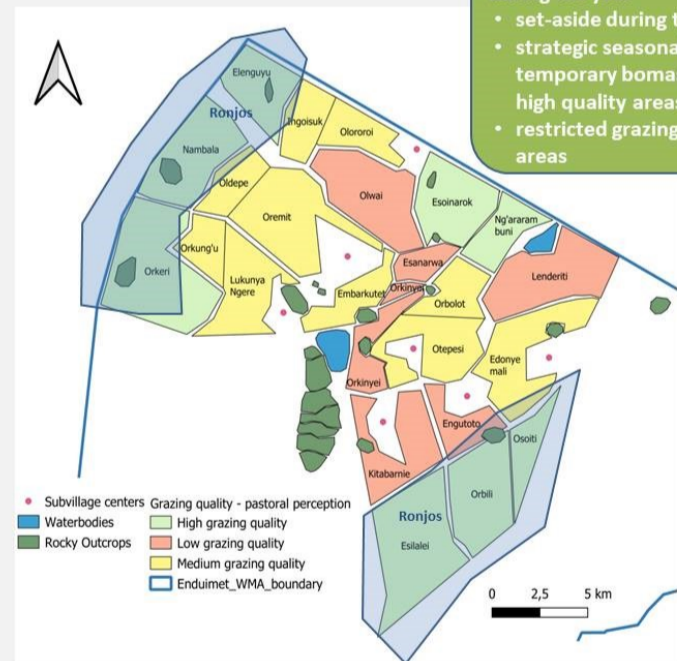


Figure 3 - Georeferenced map of the grazing units and their grazing quality status according to the pastoralists' perception and the location of the temporary homesteads (Ronjos) used from August to January as was assessed during the participatory mapping sessions with 8-12 participants across two villages, Edonyemali and LereMETA in the Enduimet Wildlife Management Area in November 2019

Conclusion

- livestock species had a significant influence on the DwD (goat/sheep herds stayed closer to the homesteads and travelled about half of the distances of the cattle) and the maximum reached distance away from the homestead during the day (maxD) (goat/sheep stayed generally closer to the homestead and no increase with increasing dryness was found) -> important to recognize for developing sustainable village rangeland management plans
- temporarily moving to other areas of village land, while also restricting access to high-quality grazing areas during the wet season and changing herd composition from cattle to small livestock dominated groups -> reduce rangeland degradation and enable adaption to changes in the herbaceous species composition

Acknowledgement:

The authors are thankful to the Fiat Panis Foundation and the Duke of Carl Scholarship for their financial support of this research

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