Interrelatedness of grazing livestock with vegetation parameters against the background of political instability in the Mahafaly region, southwestern Madagascar

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Livestock farmers in the Mahafaly region, where until today agropastoral groups keep large herds of extensively farmed zebu cattle and small ruminants, have to face several constraints such as seasonal water and forage shortage but also an enhancing number of violent conflicts related to cattle raiding. Against this background, we aimed at getting deeper insight into the highly extensive system of animal husbandry and tried to understand the major drivers for pastoral dynamics, land and resource use along a gradient in altitude and vegetation to consider the area's high spatial and temporal heterogeneity.

To investigate seasonal variations in movement and land use patterns of local cattle herds, individual animals from four villages, equally distributed within the region's coastal zone and inland plateau, were fitted with GPS tracking collars. Across seasons, plateau herds covered longer distances both to pastures (13.6±0.27 km) and water holes (2.7±0.25 km) than those from the coastal plain (*walking_dist*: 9.5±0.35 km, *dist_water*: 1.1±0.13 km). Transhumant herds were detected more vulnerable through limited access to grazing land and water resources compared to local ones. Seasonal water shortage has been confirmed as a key constraint on the plateau while cattle keeping along the coast is more limited by dry season forage availability. However, recent security issues and land use conflicts with local crop farmers are gaining importance and force livestock owners to adapt their traditional grazing management, resulting in spatio-temporal variation of cattle numbers and in the impending risk of local overgrazing and degradation of rangelands.

In order to determine the animals' preference for specific plant species as well as the nutritional quality of natural rangeland vegetation, their feeding behavior was observed and important forage plants as well as fecal samples were analyzed for nutrient concentration and diet digestibility. Among the 91 plant species consumed by cattle, 6 were determined of major importance for the animals' nutrition. The nutritive value and digestibility of the natural forage, as well as its abundance in the coastal zone, substantially decreased over the course of the dry season and emphasized the importance of supplementary forage plants, in particular *Euphorbia stenoclada*. At the same time, an unsustainable utilization and overexploitation of its wild stocks may involve to raise the pressure on nearby nature reserves.

Summarizing, this study illustrates the highly extensive and resources-driven character of the livestock system in the Mahafaly region, with herd mobility being a central element to cope with seasonal shortages in forage and water. But additional key drivers and external factors are gaining importance and increasingly affect migration decisions and grazing management. This leads to an increased risk of local overgrazing and overexploitation of natural pasture resources and thus intensifies the tension between pastoral and conservation interests. The situation therefore demonstrates the need for practical improvement suggestions and implication measures, such as the systematic forestation of supplemental forage plant species in the coastal zone and the regulation of access rights to these sources to minimize the pastoral impact on the area's unique nature and environment without compromising peoples' livelihoods.