



Factsheet #6



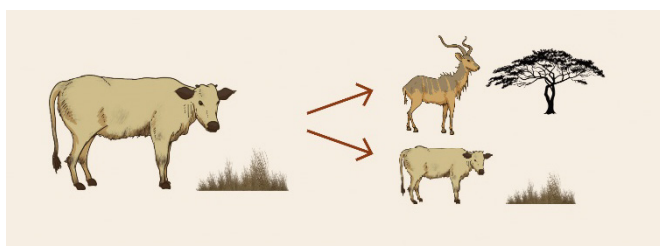
Savanna response to management strategies

A simulation model approach with climatic extremes

Current challenges

Variable rainfall and limited water availability in southern African countries make crop production unreliable. Consequently, livestock farming becomes a vital income source. However, in livestock-dominated savannas, shrub encroachment commonly occurs, leading to substantial degradation. **Unsustainable land use** (e.g. overgrazing) in combination with **climate change** (e.g. more frequent **droughts**) poses major threats to the health of a savanna and can trigger shifts to **degraded states with a reduced value** for land use. Many southern African countries have started to **shift** from livestock to integrated **wildlife systems**, such as game hunting or conservation areas. To date, wildlife management appears to bring many **benefits** such as restoration of degraded rangelands, recovery of wildlife populations, conservation of **biodiversity**, increased **economic returns** through red meat production, and tourism-related activities.

Nevertheless, the challenges posed by such management options should not be underestimated. The results of a **simulation model** that examines the impacts and potentials of **different management** strategies for the savanna are presented here to show why a greater focus and targeted efforts to promote transformation and address implementation difficulties with all its social aspects could be worthwhile.



In response to degradation, the question is whether to maintain cattle/grazer dominated farming or to shift to native browsing herbivores or a mixed system.

Main conclusions

Diverse animal communities can help to maintain a **healthy state of vegetation** assuming overstocking of both wildlife and livestock (or a combination) is avoided: plant diversity, long-term productivity and soil condition, and coping with the risks of prolonged droughts in the future.

Co-benefits to **increased income** diversity can help buffer against any shocks due to short-term climate events (e.g., droughts) with the precondition that reasonable implementation strategies are made available and are supported.

Wildlife management helps to mitigate degradation

- Heavy livestock production alone is not feasible in the long term under current conditions, even less under future climatic conditions.
- Livestock production is also not economically sustainable if additional fodder supplements are required with more frequent and prolonged droughts.
- Overstocking of livestock not only contributes to shrub encroachment but also causes an increase in bare soil, thereby adversely affecting land usability.
- Native browsers are well-adapted to feed on woody vegetation, they e.g., select for specific plant species and parts of high nutritional value and can therefore prevent shrub encroachment to some extent.
- Feeding on different vegetation types reduces pressure on grasses, protecting the topsoil and maximising the capacity of plant water uptake.




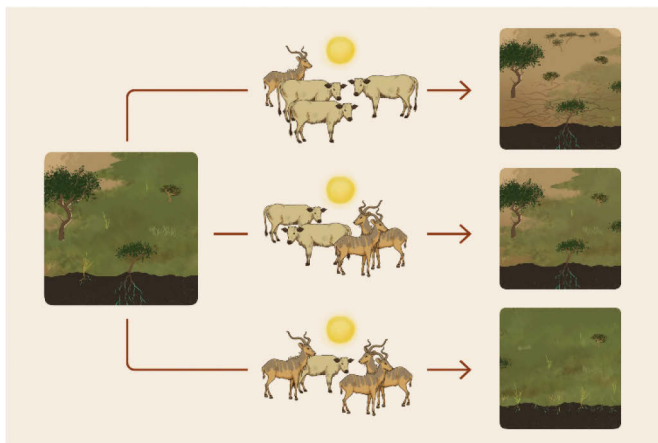
	 Grazer-dominated	 Mixed-feeders	 Browser-dominated
Plant diversity	–	++	+++
Drought resilience	–	++	+++
Ecosystem health	+	+++	+++

Table 1: The effects of different animal composition on ecosystem components. Overgrazing (left field) leads to a loss of plant diversity, drought resistance and an overall deterioration of ecosystem health. More browsing animals bring many benefits to the ecosystem.



Effects of different livestock and wildlife ratios on savanna landscapes.

- Native herbivores are **more resistant** to diseases and extreme climatic conditions.
- By incorporating browsers into the calculation of livestock units (LSU), the presence of browsers on rangelands enables a slightly higher LSU per unit area. This allows for the sustainable coexistence of both browsers and grazers on the same land.
- Our results highlight the benefits of **mixed-grazing** plans on **plant diversity**, with co-benefits to soil erosion mitigation and water retention.
- However, the challenges associated with wildlife-based management and its implementation should not be underestimated and require great effort and investment. These should be addressed together with the farmers and landowners.

References

Irob, K., Blaum, N., Weiss-Aparicio, A., Hauptfleisch, M., Hering, R., Uiseb, K., Tietjen, B. (2023). Savanna resilience to droughts increases with the proportion of browsing wild herbivores and plant functional diversity. *Journal of Applied Ecology*, 00, 1–12. <https://doi.org/10.1111/1365-2664.14351>

Irob, K., Blaum, N., Tietjen, B. (2023). Navigating uncertainty: Enhancing climate change resilience in savanna ecosystems through herbivore communities. Submitted to *Journal of Applied Ecology*.

Authors

Katja Irob (FU Berlin¹, contact: irob.k@fu-berlin.de), **Britta Tietjen** (FU Berlin), **Taylor Smith** (University of Potsdam), **Deike U. Lüttke** (ISOE², SBIK-F³), **Markus Rauchecker** (ISOE², SBIK-F³), **Morgan Hauptfleisch** (NUST⁴, Biodiversity Research Center)

¹ Freie Universität Berlin

² ISOE – Institute for Social-Ecological Research

³ Senckenberg Biodiversity & Climate Research Centre

⁴ Namibian University of Science and Technology

Acknowledgements

The authors thank the Namibian Ministry of Environment, Tourism and Forestry (MEFT) and the Namibian National Commission on Research, Science and Technology (NCRST) for research permission. We also thank the anonymous reviewer of this factsheet.

The ORYCS Project

The German-Namibian research project “ORYCS – Options for sustainable land use adaptations in savanna systems” aims to assess the suitability of wildlife management strategies in Namibia as options for adapting land use to climate change in savanna ecosystems.

www.orycs.org

The ORYCS project is part of the SPACES II research program and is funded by the German Federal Ministry of Education and Research (BMBF) under the funding reference FKZ 01LL1804A-C.

Project Coordination

German Coordination

PD Dr. Niels Blaum
E-Mail: blaum@uni-potsdam.de

Namibian Coordination

Dr. Morgan Hauptfleisch
E-Mail: mhauptfleisch@nust.na



Published by:

ORYCS Project Consortium
Frankfurt am Main, Potsdam, Berlin, Windhoek

May 2023



Attribution-NonCommercial 3.0 Germany
(CC BY-NC 3.0 DE)

