



Factsheet # 01

NamTip: a German-Namibian cooperative project

Understanding Desertification Tipping Points in the Face of Climate Change



Why study Desertification Tipping Points?

- Drylands cover 45% of Earth's land and are vital for grazing, food production, and livelihoods for billions of people. However, these fragile ecosystems are highly sensitive to change. **Even small shifts in human activity or environmental conditions can push drylands past critical thresholds, triggering sudden transformations that are difficult to reverse and pose major threats to the interaction between humans and ecosystems.**
- **Desertification is one of the most alarming consequences where grasslands degrade into barren landscapes** (Fig. 1), leading to biodiversity loss, ecosystem collapse, and reduced capacity to support wildlife and livestock. Already, 10–20% of drylands are affected, with climate change and unsustainable land use worsening the threat.
- **Predicting these desertification tipping points is difficult**, as the processes driving desertification are not well understood, different factors interact in complex patterns and, therefore, the changes are often recognized too late for reversal.
- **Improved tools to anticipate and manage these shifts are essential** to prevent or reverse desertification, protect dryland ecosystems, and ensure sustainable livelihoods for those who depend on them.

How is Namibia affected by Desertification?

- **Namibia is one of the driest countries in sub-Saharan Africa. Its vast rangelands face substantial desertification risks.**
- **With over 60% of its population in rural areas, Namibia urgently needs strategies to manage desertification risks.** The Greater Waterberg Landscape, with its mix of freehold farms and communal conservancies, provides a valuable setting to study how different land management systems impact desertification processes. Namibia thus offers the opportunity to learn from the findings of in-depth, collaborative studies for other drylands worldwide.

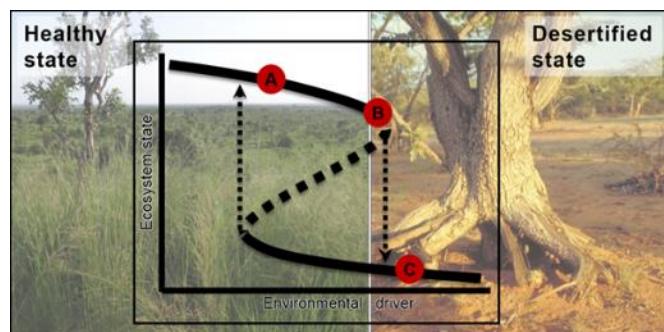


Fig. 1: Schematic of a desertification tipping point in an African savanna rangeland, illustrating the shift from a healthy state (A, B) to a desertified state (C). The transition is difficult to reverse, as the ecosystem does not easily return to its original state even when conditions improve. Credit: Anja Linstädter

NamTip's Study Approach

- **Tackling complex environmental challenges requires integrated, inter- and transdisciplinary efforts.** NamTip combines natural and social sciences within a unified research framework to address its objectives.
- **The project emphasizes collaboration with Namibian stakeholders across sectors** (Fig. 2). This includes co-designing research questions, building capacities together, and jointly sharing results. These partnerships foster mutual learning and support practical, knowledge-based solutions tailored to local needs.



Fig. 2: The NamTip project team meeting with Namibian stakeholders and practitioners (Windhoek, March 2024). Credit: Lisa-Maricia Schwarz

Project Aims

- **Improve understanding of social-ecological tipping points in dryland rangelands**, like desertification and bush encroachment, and early warning signals.
- **Study cascading tipping points** caused by interactions between ecology and human activities.
- **Explore potential future tipping points** in livestock farming and rangelands under climate change.
- **Evaluate management options for restoring degraded rangelands**, such as resting, reseeding, and bush thinning.
- **Create practical, transferable knowledge** for stakeholders and practitioners, such as this series of **factsheets** on topics related to rangeland management from both ecological and social perspectives.

Key Methods

- **Analysis of past tipping points** using time series data, archive research, interviews with farmers and experts, and analysis of policies to understand past changes.
- **Comparison of ecosystems with different levels of degradation** across farms and communal areas with varying livestock densities.
- **Field experiments** to simulate combined effects of drought & grazing on soils, plants and forage.
- **Evaluation of rangeland restoration strategies**, considering social, political, and economic factors.
- **Integration and synthesis of results** through interdisciplinary collaboration, modeling of management scenarios under climate change, and feedback processes in stakeholder dialogues.
- **Support for academic and non-academic capacity building and knowledge sharing** (Fig. 3).



Fig. 3: Discussions between researchers and stakeholders during a joint field trip to the experimental sites (Okakarara, October 2022). Credit: Stefan Liehr

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The NamTip Project

The collaborative German-Namibian research project "NamTip – A Namibian Perspective on Desertification Tipping Points in the Face of Climate Change" aims to better understand the development of ecological tipping points in dryland rangelands by assessing desertification and woody plant encroachment processes. It also explores management options for preventing such tipping points and restoring degraded rangeland ecosystems.

www.uni-potsdam.de/en/namtip

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