

Factsheet # 14

Does bush thinning restore rangelands in the long term?



Challenge

- Namibia's rangelands are affected by severe bush encroachment: woody plants take over at the expense of grasses.
- Bush encroachment often results from interactions between long-term overgrazing, suppression of fire, reduced megafauna, and climate change.
- It reduces carrying capacity, livestock productivity, and rangeland resilience, threatening livelihoods.
- Bush thinning (selective removal of woody plants) aims to:
 - Improve grass production
 - Increase carrying capacity
 - Restore ecosystem function
- Unfortunately, there is limited evidence on whether bush thinning restores rangelands in the long term or whether its benefits are short-lived.

Approach

- In 2024, surveys were done at sites on a freehold farm representing different times since bush thinning (Fig. 1).



- This setup allowed for direct comparisons of short, medium, and long-term ecological responses to bush thinning.
- Land cover, woody biomass, herbaceous productivity, soil seed bank (SSB) size & richness, and soil parameters were assessed.

Bush thinning has long-term benefits

- Woody plants shorter than 2 m (indicative of bush encroachment), and annual grasses and forb cover declined strongly after bush thinning, while perennial grass cover, SSB size, and richness increased over time, showing improved rangeland condition.
- Herbaceous productivity increased following bush thinning but declined after ~20 years, indicating that benefits diminish over time.
- Even after 40 years, woody plant cover remained below non-thinned levels, but woody plants increased in size (biomass) after bush thinning.
- Soil organic carbon (SOC) and water holding capacity hardly changed because perennial grass recovery was able to compensate for these after bush thinning.
- See table on next page for a complete overview of the findings.

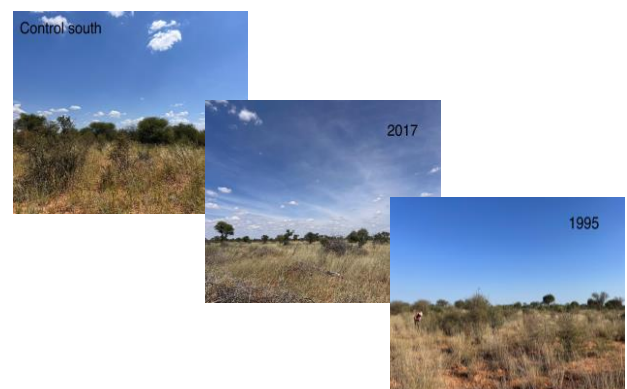


Fig. 1: Sites of different years since bush thinning. Credit: Vistorina Amputu

Ecological Indicators	Non-thinned	3-7 years	11-20 years	29-41 years	Direction of change over time
Bare ground cover (%)	38	40	48	37	↑ since bush thinning, then ↓
Annual grasses & forb plant cover (%)	22	25	10	6	↓ since bush thinning
Perennial grass cover (%)	12	30	24	36	↑ since bush thinning
Herbaceous productivity (g/m ² /year)	133	246	220	165	↑ for the first 20 years, then ↓
Woody plant cover < 2 m (%)	17	5	10	11	↓ did not return to old levels after 40 years
Woody plant cover > 2 m (%)	11	0	8	10	
Woody biomass (kg/ha)	2843	1051	6798	7458	↑ since bush thinning
Soil seed bank size (no./m ²)	51	58	52	67	↑ since bush thinning
Soil seed bank richness (no. of species)	18	20	20	25	↑ since bush thinning
Soil organic carbon (t/ha)	15	14	15	14	↔ since bush thinning
Soil water holding capacity (%)	30	31	31	30	↔ since bush thinning

Key Findings

- Long-term improvement of rangeland condition after bush thinning, due to a reduction in shrubs and consequently a recovery of perennial grasses, herbaceous productivity, and the soil seed bank.
- Reduced competition after bush thinning promotes larger woody plants, reflecting structural recovery of the rangeland.
- Soil quality does not deteriorate after bush thinning, because it is preserved as perennial grasses recover.
- Bush thinning delivers lasting ecological benefits beyond short-term improvements. When combined with adaptive grazing management (see Factsheet #8), it restores rangeland health and structure while enhancing ecosystem functioning and resilience.

Practical Implications

- Prioritize bush thinning in areas with high woody density for effective management and the restoration of degraded rangelands.
- Implement post-thinning resting periods to allow the recovery and re-establishment of desirable grazing grasses.
- Plan for long-term maintenance, as re-thinning and after-care may be required after 20 - 30 years to sustain productivity.
- Integrate bush thinning into rangeland management plans to ensure effective implementation.

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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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