

# People, Rangeland Change, & Sustain- ability in the arid southwest

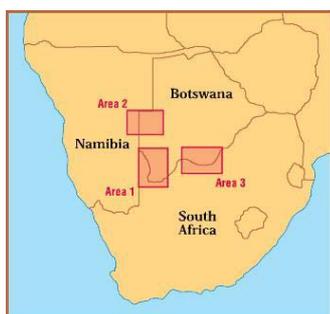
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## PANRUSA Briefing Notes

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### Key points

- Land use pressures around villages & boreholes lead to active sand dunes and reduced biodiversity
- Some land users manage livestock movements and change stock structure in attempts to manage the environment
- Innovative community schemes in the Mier are tackling bush encroachment, dune activity & grass recovery, with promising results



### Research areas:

1. Arid southwest:
  - a) Mier, South Africa
  - b) SW Kgalagadi, Botswana
2. Semiarid northwest:
  - a) Ghanzi Dist, Botswana
  - b) Omaheke, Namibia
3. Dry sub-humid southeast:
  - a) NW Province South Africa,
  - b) Barolong, Botswana

The arid southwest study area has few natural resources. It is an area of rolling, partially vegetated, sand dunes and dry river valleys. All settlements and farms depend on borehole water. For several decades livestock production centred on farms in the Mier area of South Africa and in Botswana close to the Nossob valley. Boreholes in SW Botswana have increased in number since the 1970s, leading to villages and cattleposts developing eastwards from the Nossob. Sheep, cattle and goats are the most important stock but diversification to include wildlife ranching is occurring, especially in South Africa. Dune crests are naturally active in drought periods but this becomes a permanent phenomenon where land use pressures are high. PANRUSA research in 2000 included environmental assessments and the construction of 'participatory maps' with livestock owners (see *Briefing Note 1B*). Allied research in the Mier area has focussed on stabilising active dunes on heavily degraded farms as part of a community-based land restoration programme (see BN 4A).

### Study areas

*Environmental studies occurred at four locations: Struizendam*, a village on the Nossob valley that was established in the early 1940s for farmers displaced when the Kalahari National (now Transfrontier) Park (KTP) was established. With the fenced border with South Africa just 100m to the west and fenced farms immediately to the north, livestock movements and other resource pressures focus in an easterly direction. *Welkom* is a farm north of Struizendam, established in the 1970s for karakul production but with a diversity of stock today, and again subject to an eastward focus of activity. *Khawa* is a RAD village 90km to the west, established in the 1970s. It is borehole-centred, and there are no directional constraints on resource use activities. *Hartebeest & Good Hope* are private boreholes 7.5km apart, developed in the 1980s on communal land between Struizendam and Khawa, close to the KTP and the communal Tshane-Tshane cattlepost.

## Natural resources

Bare dunes & sour grass increase and species diversity decreases with proximity to both study villages. Bare dunes extend 5km east of **Struizendam**, with 20m high active dunes immediately north of the village forming since 1945. 1km E plants cover only 15% of the ground, increasing to 25% at 2km and 40-50% at 5km, within the range of natural cover in this arid region. Palatable perennials only exceed 3% ground cover at distances beyond 15km, where they peak at 22%. **Khawa** has similar but less intense impacts: bare dunes and sour grass (up to 20% cover) dominate within 5km, at the expense of palatable grasses that peak at 20% cover 10 km from the village. Within 2.5km of Struizendam woody species are sparse (<5 plants /100m<sup>2</sup>) and largely comprise the encroachers *A. mellifera* and *Rhigozum*, both poor as fuelwood. This is not a problem at Khawa, where trees and shrubs occur at 20/100km<sup>2</sup>.

On the farms & cattleposts grazing impacts again manifest themselves through the dominance of sour grass at the expense of nutritious perennials. At **Welkom** impacts are notable but patchy, reflecting the division of the farm into fenced paddocks and the sinking of a second borehole away from the river valley. Over 40% of the ground is bare throughout the farm except where *Rhigozum* thickets occur. North of the main borehole sour grass provides up to 50% cover within 1km of the borehole, and 25-40% at greater distances, but to the west in a different paddock sour grass covers less than 20% at most distances from the borehole. The most palatable perennials however never represent more than 15% cover, & often less than 5%, at any location. The area between **Hartebeest & Good Hope** is presently unfenced, but livestock numbers are relatively low, so palatable perennials remain dominant. This is in marked contrast to communal Tshane-Tshane where annuals dominate, *Rhigozum* encroachment is occurring, and active dunes dominate an extensive sacrifice zone.

### Map of the arid south west



## Land user responses to change

Residents of both Botswana study villages are aware of changes occurring in the environment, many of which are inevitable in this dry environment. Remedial dune stabilisation schemes, involving planting exotic gum trees, have been attempted at both settlements but have not expanded beyond demonstration plots.

In communal areas the widespread occurrence of sour grass is seen as a function of both drought impacts and grazing pressures. Livestock owners held various views about ecological changes occurring on their lands. At **Welkom** grazing rotation is practised to try and reduce pressure points, which in part explains the ecological differences between paddocks. The growth of creepers and particularly Tsama melons following good rains is also seen as reducing pressure on grasses & the borehole dependency of livestock.

Interdune bush encroachment (especially by *Rhigozum*) is a local problem in Botswana but a major one on degraded farms in the Mier District. Small stock however use *Rhigozum* flowers as a spring feed, which farmers in Botswana viewed as beneficial and relieving pressure on grasses at a critical growth time. In the Mier District *Rhigozum* encroachment has been severe on heavily degraded farms that also display highly active dune crests. A community project is tackling these two problems in an innovative way: the shrub is being cleared by hand in interdunes and the deadwood used to stabilise active dune crests prior to sowing perennial grass seeds that would otherwise blow away.

The choice of livestock by farmers is also recognised as a way of controlling or responding to degradation. Smallstock will browse encroaching bushes more readily than cattle. Native antelope are drought resistant and more environmentally friendly than both cattle and goats. They have replaced cattle on some Mier farms, a move that some Botswana farmers wish to make too.

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