Bush encroachment in the Auas-Oanob Conservancy, Namibia:

Mixing local expert knowledge and science to unravel salient factors through the Ecosystem Management Understanding (EMU) Process

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A small group of community-based Ecosystem Management Understanding ("EMU") ecologists from Western Australia travelled to Namibia in 2003 and ran a field-based workshop in land management with the Auas-Oanob Conservancy near Windhoek, with local support from the Polytechnic of Namibia. EMU is a landscape literacy programme in which local landholders are helped to use their experience and local knowledge to characterise their properties (in this case farms) as ecological systems within larger systems and so improve landscape productivity and the quality of the land as habitat to livestock and wildlife. EMU is a capacity building programme based on partnership learning that relies heavily on the participatory methods developed by Ken Tinley in southern Africa some decades ago.

In January 2008, the Auas-Oanob Conservancy held a review of its progress within the Ecosystem Management Understanding (EMU) Process (Tinley and Pringle 2002) at Farm Lichtenstein Sud, some 50km south of the Namibian capital Windhoek. The day started with a presentation of the EMU overlays of Farm Lichtenstein Sud by the owners, Friedel and Irmgard Rusch, in which the location of bush encroachment and its landscape (drainage pattern) context quickly became the major focus of discussion.

Hugh Pringle presented a model that describes how bush encroachment in critical, fertile bottomlands throughout catchments is related to landscape incision and declining soil moisture balances (Pringle and Tinley 2003; Pringle *et al*. 2006), which has its foundations in Ken Tinley's earlier work across

southern Africa (Tinley 1982), including many years in Namibia as one of its first Government ecologists.

It was generally accepted that, based on local recollections of landscape change, parts of landscapes and parts of catchments that were once seasonally inundated but are now incised and "leaking" (Ludwig *et al*. 2004; Pringle and Tinley 2003) no longer suppress bush, particularly *Acacia karroo* in lowlands, but also swarthaak (*Acacia mellifera*) and rooihaak (*A. reficiens*) more widely. This geomorphic issue (Pringle and Tinley 2003) is not given recognition as a driving process in critical parts of landscapes for both livestock and wildlife in arid and semi-arid southern Africa (e.g. Illius and O'Connor 2000), Namibia being no exception (de Klerk 2004).

The idea of soil desiccation was then also grasped by some farmers as a key factor in bush encroachment on pediments and lower hill slopes, up slope of most biologically productive, seasonally inundated areas. The desiccation they explained, results from degraded soil surface conditions for infiltration and therefore increased run off. The idea is that a landscape that harvests (through slowing and then infiltration) less water than before, dries out more quickly and clearly further favours bush over palatable perennial pasture grass species (Tinley 2001; 1982). The basal area of grasses increases infiltration, but is only one of several surface types that support this critical local process (Tongway *et al.* 2003; Walker 1974).

While the normal explanation of bush-grass competition was acknowledged by all, the idea that this competitive balance was driven by soil degradation as well as selective grazing pressure was illuminating. The farmers, without any formal exposure to Landscape Function Analysis (Tongway and Hindley 1995), saw that overgrazing, even without obvious signs of soil erosion, simply left the soil less likely to absorb rain.

There was general agreement that grazing management had to become more ecologically

Photo: Ibo Zimmermann

Workshop participants inspect one of the gully filters

based to minimise soil erosion and bush encroachment. It was when we started to discuss what "ecological grazing management" meant practically, that the issue of fire was raised. One farmer suggested that fire was always part of the natural system before commercial farming, a proposition that immediately attracted vigorous debate. Eventually, it was agreed that the absence of fire was probably another key factor in bush encroachment and related to lack of fuel.

The question was then raised, if a burnt area is destocked, what stops the wildlife from concentrating there and redirecting early succession processes undesirably? There were strong arguments for not doing any burning at all, but all of the Conservancy members agreed that some novel thinking was needed to incorporate fire at the best time to kill young bush plants when observed.

The discussion had shifted considerably from the prevailing, strictly localised perspective of palatable grasses versus bush species under heavy and continuous grazing pressure, to broader landscape management of key factors, soil moisture harvesting and fire, as well as total grazing pressure. No silver bullet solution was identified, but as a group of farmers and scientists, we had started thinking about what kinds of things might shift the balance back towards grasses against bush species that simplify, rather than enhance the landscape. We adjourned for lunch, which was characterised by numerous intense discussions about these factors and the future management of the Conservancy's landscapes.

In the afternoon we visited the site of a restoration project that was identified by the hosts, Friedel and Irmgard Rusch as a priority pilot study after the EMU Process in 2003. The restoration plan was drawn up by Hugh Pringle in consultation with the Rusch's and implemented with the help of students of the Polytechnic of Namibia. A gully system had been treated with filters made from branches of Acacia mellifera growing in dense stands nearby (Shamathe *et al.* 2008), thereby converting a problem into a solution. There had been insufficient rain to determine the effectiveness of the filters to flip the system from one of losing resources to one of capturing them, but enough to see that grass growth under filters was better than that in the open.

The farmers' discussions continued on the site as our Polytechnic of Namibia bakkie departed. We will have to get back there to learn what the farmers came up with! It was great to stir the pot and then listen and learn from good farmers who want to make changes, EMU style!

The challenge is now to investigate this collective knowledge, test contradictory ideas and therefore improve Ecosystem Management Understanding, and to refine decision support tools (Joubert *et al.* 2008a; b). This will lead to better land management, healthier landscapes and businesses and therefore be a national contribution.

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