

GSSA Prestige Symposium

Rehabilitating

rangelands

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Introduction

Rehabilitation of degraded veld has become a major area of concern, as more and more land is used for mining, forestry, agricultural development or is simply overgrazed. Invasion of alien species is a worldwide problem, as invasive plants cause massive ecological damage with important socio-economic consequences such as diminished water availability and reduced grazing capacity.

It was to address these issues that the Grassland Society of Southern Africa, through Justin du Toit of the University of KwaZulu-Natal and Freyni du Toit of dNA Solutions, arranged a GSSA Prestige Grazing Symposium on rehabilitating rangelands.

The event was attended by 95 people from all over the country and from neighbouring countries. There was even an apology from Hugh Pringle of Australia, who forwarded

a recent paper that he and Ken Tinley published on managing degradation in a landscape rather than local context (Pringle and Tinley 2003). Participants represented a variety of government and parastatal institutions, as well as the private sector.

The talks could be broadly divided into two categories: the rehabilitation of degraded ecosystems, and the control and management of alien plants. There were a couple of talks that did not fit neatly into either of these categories, but they were interesting enough to deserve a place of their own. Both major sets of talks contained discussions both about the technological processes involved and the socio-economic implications of different strategies.

Controversial discussion

Iain Buchan, a landowner from Nottingham Road, kickstarted the day

by giving, in no uncertain terms, his opinion of the role of forestry companies in clearing up their land before moving on. Iain bought a property owned by a major forestry company which had recently been cleared of about 80 ha of pine plantations. However, the problem of managing the existing aliens, the soil erosion and the massive seed-bank of invasive species was largely left to the new owner – Iain. He gave a detailed account of his negotiations and fights with the forestry company, and revealed to us that he would soon be taking them to court. The results of the court application could have important consequences for the future, and anyone dealing with similar issues might be well advised to follow the case with interest.

Oil drums and snakes: rehabilitating degraded veld

Kevin Kirkman, Professor of Grassland Science at the University of KwaZulu-Natal in Pietermaritzburg, followed with a summary of his team's efforts over the past few years to develop simple, cost-effective technology to harvest indigenous grass seed from the veld and replant it in degraded areas. As Kevin put it, "in about ten years, many lands established to biofuels will need to be established to something more useful".

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One of the seed harvesters developed was called by him the “Castrol seed harvester”, although everyone else knows it as the “Kirkman combine”. Justin du Toit reported on it in the 10 December 2004 issue of *Farmer's Weekly*. Simply put, it is an oil drum cut in half, the two halves welded end to end, and mounted with a simple frame on the front of a bakkie. The leading edge of this trough is serrated, and the bakkie is driven through the veld at the right season. The amount of seed collected by the Kirkman combine is phenomenal. The Grassland Science section has also developed more sophisticated, tractor-mounted vacuum seed harvesters, which are also extremely effective.

However, the planting of the seed has caused more headaches. A large variety of seed is collected, of all shapes and sizes, as well as a great deal of extra plant material, insects, and the odd snake. Cleaning this mixture is extremely difficult and expensive. The seed must be stored correctly for about a year to break dormancy, and the various species (as well as other bits and the odd snake) need to remain evenly mixed when planted. Eventually, the team struck on the idea of using a modified gel planter, as used by the vegetable industry. The seed is mixed into a thick, wa-



Justin du Toit opens the Symposium

may in fact be too high for most of the indigenous grasses, particularly *Themeda*, which is easily out-competed by other plants in high-fertility soils. Post-planting management is also crucial; weeds may need to be managed, as many veld grasses (especially in sourveld) have a low tolerance for shade. The area may need to be regularly burnt or mown.

ter-based gel and squeezed from the end of the planter like toothpaste from a toothpaste tube.

Much work still needs to be done to overcome technical hitches and to gain a better understanding of the ecological processes involved in using wild-harvested seed for rehabilitation, but the progress so far is exciting.

Justin du Toit presented the results of his research into a completely different technique of rehabilitating grasslands – harvesting grass tufts in the wild and multiplying the tillers in the nursery. With correct management, the grass tillers can multiply quickly – in some cases, more than one new tiller per day per parent tiller. The tillers are then planted by hand into the area to be rehabilitated. Variables that need to be considered are the density and season of planting and the history of the land that is being planted. In the case of previously cultivated lands, the residual fertility

Many different kinds of wastes are generated by industry and households, and management of these wastes is a growing concern. An ideal solution to managing the wastes would be to put them to some use. Louis Titshall of the University of KwaZulu-Natal presented the results of his Master's research into using sewerage sludge to rehabilitate coal mines. He ran greenhouse trials with different grass species grown in sewerage sludge with different amelioration treatments, and found very mixed results. Some grass species required sewerage sludge to be ameliorated, while others showed greater production in the non-ameliorated sludge. Every waste product is chemically and physically unique, and few generalisations can be made about possible uses for or treatments of waste products.

Terry Everson summarised her years of effort in the Drakensberg to encourage a community to rehabilitate their degraded veld and to bet-



ter manage their land. Many of her team's efforts have been highly successful – most importantly the sense of ownership that many community members now feel for their veld as an important resource. She established a monitoring group, which for the last six years has been using very simple and useful techniques to monitor the effectiveness of their erosion control and veld management efforts in reclaiming degraded land. The monitoring group, on their own initiative, have begun educating schoolchildren about the importance of managing natural resources sustainably. The kids “adopted” a donga of their own, and have begun rehabilitation efforts in their donga. Importantly, the simple instruments that were used by the monitoring group to measure soil movement and donga reclamation are no longer being used as toys by the children.

If payment for carbon sequestration or other ecosystem services becomes a reality, then communities like the one she worked in for so long have a real chance of being properly compensated for conserving their resources.

Damien Walters of the Mondi

Wetlands Project talked about the challenges his team faced in getting farmers to realise the importance of conserving their wetlands. The technology for rehabilitating wetlands is well-established, but the human use of wetlands has often been neglected by the engineers. Until recently, the Mondi Wetlands Programme was primarily a poverty-relief programme. The Programme would simply approach a landowner and ask for permission to access his land to “fix” a wetland. The landowner would usually accede happily, but months or years later might rapidly change his mind once his potato fields became flooded by the now-functioning wetland. The Mondi Wetlands Project is therefore embarking on a new management strategy of involving the landowners far more thoroughly in the rehabilitation process and the post-rehabilitation management of the wetland.

Don't kill the pretty flowers: Alien plant control and ecology

Michael Braack of the KZN Department of Agriculture and Environ-

mental Affairs' Alien Invasive Plant Programme graphically demonstrated the pitiful budget that is allocated to alien plant management relative to the need, by slicing up a small piece of paper with a pair of scissors: if the budget requirement for alien plant control was the size of the room, the total allocated budget was the piece of paper. Of course, half of that goes on salaries, a considerable portion on administration and bureaucracy, a large percentage on meetings and catering; leaving a small sliver of budget left for actual physical control of alien plants.

Nonetheless, the Alien Invasive Programme has achieved some success by focussing its resources where they can do the most good. Several teams are stationed around KZN, focussing purely on emerging weeds - weeds that are not yet a problem in the province, but will become important pests if not managed. One example is pompom weed (*Campuloclinium macrocephalum*), a major problem in the grasslands of Gauteng. Research conducted by the Agricultural Research Council's (ARC) Plant Protection Research Institute showed that herbicide spraying programmes needed to be concentrated before pompom weed begins to flower; any spraying thereafter would be a waste of resources as the seeds would still be viable. Michael presented various sensible proposals to allocate resources effectively.

One of the major issues faced by alien plant control programmes is public ignorance: many category 1 alien plants are introduced and

spread as ornamental plants. A good example of public antagonism to alien plant control is the case of the Formosa lily (*Lilium formosatum*), a beautiful but aggressive invader of wetlands.

Michael also presented the unique programme that he runs at Cedara, planking timber and building coffins. Only free-standing alien timber that is not economically viable for commercial contractors to remove is chosen for the programme - the programme is not intending to put operators out of business. The coffins that are built range from relatively luxury coffins to basic wooden coffins with rope handles, selling for less than R300. There is a desperate need for these bottom-of-the range coffins to bring some dignity to the funerals of poor people, who are often buried in little more than a blanket.

Terry Olckers was employed at the ARC's Plant Protection Research Institute for many years, searching for biocontrol agents for bugweed (*Solanum mauritianum*). About four years ago he moved to the University of KwaZulu-Natal, having nearly lost hope in finding an effective biocontrol agent. After years of effort, two biocontrol agents had been identified, one insect species, the bugweed lace bug (*Gargaphia decoris*) that attacked the leaves and another insect, a flower weevil, that attacked the flowers (*Anthonomus santacruxi*). The lace bug had been released some years previously but with little apparent impact, while the unbelievable bureaucratic delays in approv-

ing the flower weevil (four years from application to approval, *after* years of testing had been carried out), had resulted in the latter programme being put on hold. However, a colleague in Sabi phoned him last winter “voice trembling with excitement” to report that an entire forest of bugweed had been defoliated by the lace- bug. Some unknown combination of factors had caused a population explosion in the insect which had devastated the local bugweed population. Unfortunately, before any more information could be gathered, the forest and the lace- bug population were destroyed by the devastating plantation fires last winter. Terry appealed to anyone who observes the leaves of bugweed being significantly attacked to let him know (contact the GSSA for more information). The flower weevil is in culture at the University with a postgraduate student doing research on it.

A reasonably well-known and unsurprising weed in pastures, sugar-cane and orchards is a low-growing herbaceous plant from South America called *Richardia brasiliensis*. Recently, the plant has been noted in degraded and heavily-grazed veld in the KwaZulu-Natal midlands and in other humid grasslands of South Africa. Alan Short presented some preliminary results from herbicide and burning trials conducted on a farm near Nottingham Road, on the abundance of *Richardia* in the veld. Very little is known about the ecology of *Richardia* in natural veld. The fire trials were inconclusive, probably be-

cause the fuel loads were too low to have any effect on the weed. The herbicide trials showed that 2,4-D performed better than bendioxide in controlling *Richardia*, but that the effect was relatively short-lived. The question remains whether *Richardia* needs to be classified as another emerging alien invasive plant, or whether its distribution in veld is limited to already degraded areas.

“Biofuels – the biggest scam on Earth” (Time Magazine)

Time Magazine (Grunwald 2008) recently ran a cover feature exposing the ecological destruction and economic mayhem being caused by the current global obsession with biofuels, and highlighting the net carbon increase caused by biofuel farming in many parts of the world (virgin lands being transformed for agricultural production, causing carbon to be released into the atmosphere).

Helen King of the University of KwaZulu-Natal, citing recent work by David Tilman (Tilman *et al.* 2006), described how degraded agricultural land, rehabilitated with low-input, high diversity plant mixtures, can be used for biofuel production. The potential ecological benefits of harvesting degraded grasslands for biofuel production, rather than transforming them for crop production, could be enormous. Tilman calculated the net carbon balance from harvesting species-rich plots (16 spp) (as opposed to species-poor grassland crops such as switchgrass) to be negative – that is, more carbon

would be sequestered underground than released into the atmosphere once the fuel was produced and burned. Crops grown for biofuels are now being seen as carbon-positive – more carbon is released into the atmosphere by the production of biofuels from these crops than is conserved.

The carbon stored underground in rangelands is enormous, but the international community has yet to acknowledge the role of anything other than forests in carbon sequestration.

There is growing awareness around the world that biofuels are not the “win-win” product that many thought them to be. Even if every square inch of arable land on the planet was converted to biofuel crops such as maize, soya, or sugar cane, the impact on global fossil fuel consumption and greenhouse gas emissions would be negligible, and the economic impact in terms of food production would be enormous. The current global increase in food prices is partly blamed on the amount of crops being diverted to biofuel production.

Field trip

Justin du Toit took the delegates around his various rehabilitation trials the next day, ranging from the nursery where he propagates the plants he uses in his work, to the final product on two very different sites in the midlands. The first site was on formerly cultivated lands near Howick, where the residual fertility was very high and weed control was a top priority. The second site was on Iain Buchan's land

near Nottingham road on former plantation land. All the sites generated a great deal of discussion and debate about the relative merits of different rehabilitation methods.

The Symposium was extremely successful in achieving its ends: to bring together practitioners dealing with practical problems of rehabilitation and to generate ideas and discussion. The fact that there were several people from the private sector present shows that rehabilitation of degraded rangelands is an issue that is becoming increasingly important to industry as well as to traditional conservationists.

The event will be held annually from now on, with the aim of presenting the latest technology and experiences in rangeland rehabilitation from around southern Africa.

References

- du Toit JCO. 2004. Veld management: Healing the veld with harvested seed. *Farmer's Weekly*, 10 December 2004 pp 34-35.
- Grunwald M. 2008. The Clean Energy Scam. *Time Magazine*, 27 Mar 2008. www.time.com/time/magazine/article/0,9171,1725975-2,00.html
- Pringle H and Tinley K. 2003. Are we overlooking critical geomorphic determinants of landscape change in Australian rangelands? *Ecological Management & Restoration*. 4 (3): 180-186
- Tilman D, Hill J and Lehman C. 2006. Carbon-negative biofuels from low-input high-diversity grassland biomass. *Science* 314. 1598-1600

