

Restoration of Mined Areas in Namibia's Sperrgebiet

By Herta Kolberg



Seedlings of *Juttadinteria alбата* being transplanted onto the experimental site

PHOTO: T. THOLKES

The south-western corner of Namibia, known as the Sperrgebiet, has been declared a national park. However, the area has a long history of diamond mining, with Namdeb Diamond Corporation holding the current mining licence. Namdeb are committed to biodiversity restoration prior to handing mined areas back to the park authorities. Between 2006 and 2010 the MSBP worked with Namdeb on this activity. Two areas, Bogenfels and Sendelingsdrift, were selected because of their importance for biodiversity conservation, importance for tourism, and opportunity for involvement before mining commenced.

Very little is known about restoration in Namibia and in the southern Namib desert, with its difficult environmental conditions, this is quite a challenge. The work centred on collection and storage of seed as well as small trials to test restoration methodologies. The approach to restoration had to be as simple and practical as possible, because it would have to be implemented by non-specialist personnel at the mine. We also included some training of mine staff in seed collecting and storage on-site.

Seed Collection and Storage

As much as possible of the seed that was available, was collected and stored both on-site (in paper bags in a wooden shed) and at the genebank in Windhoek. The on-site storage served as an experiment to test if seeds could survive under ambient conditions for the relatively short time until re-seeding. Another test was to store whole plants of those species that retain their seed and establish whether spreading of this dried plant material would aid re-seeding. Seed in on-site storage was tested for viability in 2009 and most still showed acceptable germination percentages. Because of unforeseen delays in the mining process, re-seeding of mined-out areas has not yet commenced and we cannot yet assess the effectiveness of these methods.

Re-establishment of *Salsola* hummocks at Bogenfels

It was already known that the predominant perennial species at Bogenfels, *Salsola nollothensis* (Chenopodiaceae), does not easily re-establish.



Windbreaks constructed of seaweed

PHOTO: H. KOLBERG

Therefore work at Bogenfels focused on re-establishment of *Salsola* hummocks, as well as collection and storage of a representative variety of seed for re-seeding mined-out areas.

For fast and efficient seed collection it was decided to collect the debris that gathers in depressions and in the lee of plants which contains *Salsola* seed. Windbreaks were constructed using washed-up seaweed and seeded with *Salsola* in May 2007, in the hope of rain during the upcoming rainy season. There was, however, not sufficient rain during the 2007 nor the 2008 season and to date no emergence of any *Salsola* in the windbreaks is evident.

To supplement seeding experiments, seedlings were raised off-site (at the National Botanical Research Institute). Several young plants have now been grown and transplanting will start in May 2011. It is planned to provide initial watering and shelter from wind.

Research into the seed properties of *Salsola nollothensis* was established at the MSB to investigate factors that could contribute to the lack of re-establishment. The work revealed that less than half of collected fruit were filled and that seed loses viability relatively rapidly. Burial experiments showed that with increasing depth of burial the number of emerging seedlings decreases significantly. The results suggest *Salsola* seed needs to receive sufficient rain at just the right moment before it is buried too deeply, blown into unsuitable habitat or has lost viability. It was found that it is possible to manually separate filled from unfilled fruit, and that fruit with bracts removed germinate better than fruit with bracts intact. Full results are due to be published in *Ecological Restoration* in July 2011

Sendelingsdrift

Mining at Sendelingsdrift will affect the core population of *Juttadinteria albata* (Aizoaceae), a threatened succulent plant with a very limited distribution.

An experimental site was set up at Sendelingsdrift using medium-sized and fine mine tailings and a control natural area. Over 50 mature plants of *Juttadinteria* were transplanted into these sites and watered only once at planting. In July 2008 cuttings and seedlings raised at the National Botanic Garden in Windhoek were transplanted onto the experimental site and

watered weekly or every second week for a month. At the last monitoring in October 2009, the control site showed much better results than the tailings site. Seedlings also performed better than the cuttings or whole transplanted plants. It was decided to re-think the use of tailings material in ways that more resemble the natural conditions. Further experiments with the age of seedlings need to be conducted, as it seems that the seedlings transplanted may have been too young.

Conclusions

Activities undertaken under this project have shown that restoration in the southern Namib desert is complex, depending on both environmental conditions and properties of the species concerned. The importance of seed-based research to clarify these conditions, was demonstrated.

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Restoration – Tales from the Riverbank by Angie Bell MSB



Kew staff and colleagues planting the Triangular Club Rushes

PHOTO: STEPHANIE MILES

Schoenoplectus triquetus, or Triangular Club Rush, is extremely rare and can now only be found in one spot on the banks of the River Tamar in South West England in an area of about 4m². Although not as spectacular, it has been described as the UK's botanical equivalent to the tiger. Reasons it is close to extinction in the UK are thought to be changes in riverbank management, stormier weather conditions and the increased competition from other, faster growing reeds and alien waterside plants. A collaborative project between Kew, the National Trust, the Environment Agency, Natural England and Panscape Environmental Consultants, is working very hard to save this precious native species.

The first successful re-introductions were made to the River Tamar in the 1990s. In June 2010, staff from the MSB travelled to Cornwall to deliver 285 plants to a specially created nursery on the river bank. These plants had been grown at Wakehurst Place from both seeds stored at the MSB, and from propagated plants kept in the nursery since the last re-introductions.



Jo Walmisley with one of the pots ready for planting out

PHOTO: STEPHANIE MILES

Staff at the MSB carried out non-routine germination tests to generate the extra seedlings for the project. Seeds were sown on 1% agar and chilled at 5°C for 8 weeks before being moved to 35/20°C. 145 out of the 150 seeds sown germinated into healthy seedlings within 21 days at the germination temperature. These were then passed on to the nursery where they were grown on ready for re-introduction.

Ted Chapman, Wakehurst Plant Propagation and Conservation Unit Team Leader, said, "We are delighted that, by using the scientific and horticultural expertise at Wakehurst Place, we have been able to help return such a significant number of these critically endangered plants to the wild."

Monitoring of the *S. triquetus* population on the upper Tamar continues with all the 1998 and 2010 transplants being assessed. The observations have found that the plants have established well with very few losses. The 1998 transplant population has increased in biomass and area during the 2010 season and the number of clumps producing flowers has also increased.

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