Left. **A potential candidate for horticultural use, th dwarf succulent *Ebracteola derenbergiana* tolera re-location and can be propagated from cuttings.**
Below left. **Rocky outcrops in the southern Namib are particularly rich in plant species.**
Below right. **Nearly 700 plants of some forty different species were moved from the southern Namib to the National Botanical Research Institut in Windhoek for re-location and propagation trial during this pioneering project in Namibia.**
Bottom of page. **The dwarf succulent *Dracophilus dealbatus* responds well to re-location and may b of horticultural value.**

# LIVING DIA

*A pilot study to test the re-location and propagation potential of precious indigenous southern Namib plant species threatened by mining shows that re-planting disturbed areas is a practical solution to preserving Namibia's fascinating winter rainfall flora.*

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The southern Namib Desert, an extension of the Cape's succulent Karoo, is one of Namibia's most important botanical areas. Here many plants thrive on gentle winter rains and fog, although summer rains play an increasingly important part when moving to the north and east. As a result of these contrasting rain regimes, a diverse mix of plant species occurs in the area - some adapted to winter and some to summer rains. The flora is thus very rich and harbours many species of conservation importance, quite a few occurring in this area only.

The sandy and coastal plains as well as rocky outcrops, are mainly covered in low, leaf-succulent shrubs that often dominate the vegetation. Similar to South Africa's succulent Karoo, members of the Mesembryanthemaceae or 'vygies' are the most diverse taxonomic group. For nearly a century the largest part of the southern Namib has been closed to the public by the local diamond industry, a mixed blessing as this has helped to preserve vast stretches of land in nearly pristine wilderness condition. On the other hand, it has also modified landscapes beyond recognition.

Major plans for new mines, more prospecting, tourism and the infrastructure required to support these new developments are on the table at present. If these development projects go ahead in this environmentally sensitive area, what can be done to minimize the scars of human impact?

Taking a pragmatic approach the National Botanical Research Institute in Windhoek, with the support of two mining companies, embarked on a pilot study to test the relocation and propagation potential of some indigenous southern Namib plant species. Realising that conventional methods of rehabilitation, such as planting pastures, are neither feasible in this wind-swept, arid

*These findings illustrate that re-planting disturbed areas with indigenous plant species is not an imaginary suggestion of hard-core conservationists, but a practical solution which could help to balance conservation and development needs in this Namibian biodiversity hotspot*

environment nor desirable from a conservation perspective, only indigenous species adapted to these extreme conditions will provide suitable candidates for re-planting to rehabilitate disturbed areas. Drawing from experience elsewhere, small dwarf and leaf-succulents were expected to provide the most promising candidates, although examples of other growth forms, such as shrubs and geophytes, were also included in the study. In a week of sand-blasting, hot bergwinds and soaking fog, a team of botanists from the Institute 'lifted' a total of nearly 700 plants from some 40 species from an area ear-marked for a new mine in the eastern Diamond area. Without sophisticated storage facilities, the plants were simply excavated and transported to Windhoek, where there were carefully planted and stored.

In addition to obtaining a stock of plants for propagation trials, survival rates of these species under different climatic conditions (the Windhoek highlands usually receive summer rains) would indicate their potential tolerance to relocation and temporary storage.

# MONDS

This would also reveal the horticultural potential of some of these species, perhaps for the Capital's gardens. During this year-long experiment, with most plants receiving water only once a month, the survival rate of the succulent species was encouragingly high for the first six months. However, with the exception of some dwarf succulents, mortalities increased exponentially thereafter, possibly because of the higher temperature extremes in Windhoek. Unfortunately at the same time, building operations at the Institute required the removal of the plants to a less suitable location, which could have influenced survival rates. However, even after one year, the most promising trial plants, *Sarcocaulon patersonii*, *Euphorbia melanohydrata* and *Ebracteola derenbergiana* showed an encouraging 70% survival.

The second part of this study focussed on testing propagation methods. Selecting plants from different groups, cuttings of five different species were prepared. The stem-succulent *Othonna cylindrica* and the stem- and leaf-succulent *Brownanthus arenosus* showed root development in most cuttings, and one of the two dwarf succulents, *Ebracteola derenbergiana*, showed some root development after three weeks. *Eberlanzia schneideriana* and *Dracophilus dealbatus* may require a longer observation period, a different cutting technique, or different watering regime, but none of the cuttings of these species were successful.

Although propagation from seed could not be tested because two fairly poor seasons in the study area did not yield any seeds, an interesting observation on the trial plants in Windhoek confirmed that germination from seed **is** another option for propagating these indigenous plants. Germination seems to occur easily with mesembs, and seedlings appeared in most mesembs' pots after the onset of the summer rains in Windhoek. Protected from the rain under a roof, this phenomenon is thought to be linked to higher air humidity rather than the actual rains.

Another little experiment on site, we called it 'in situ' relocation, rounded up the testing of methods. We transplanted a number of stem-succulent *Euphorbia melanohydrata* plants on sandy plains in the study area. The plants received water once after transplanting, more to stabilize the sand than to provide moisture, and were left to their own devices for a year. Most survived, and those that did not were actually dug up by burrowing animals. Encouraged by this simple trial, individuals of another four species were transplanted in the same unsophisticated manner in the field, to be monitored in due course before mining may destroy this site.

Where large tracks of land covered with precious succulents need to be cleared, we expect that many species can be rescued, stored temporarily and used for re-planting in disturbed areas or for landscaping and gardening purposes. Moreover, if large amounts of plant material become available, too much to be stored temporarily, this could be sold to local nurseries with the proviso that a share of the profits made from the selling the plants is put back into testing restoration and propagation methods.

Using fairly simple techniques, this pilot study was encouraging as it showed that many southern Namib plant species can tolerate re-location to a locality with different climatic conditions, can be re-planted within the study area without regular irrigation and can be propagated by cuttings and seed. These findings illustrate that re-planting disturbed areas with indigenous plant species is not an imaginary suggestion of hard-core conservationists, but a practical solution which could help to balance conservation and development needs in this Namibian biodiversity 'hotspot'. Much more work is required to refine techniques, test more plant species and actually re-plant in disturbed areas on a trial basis.

Encouraged by these positive results and realizing the need to develop a more comprehensive research and monitoring framework for restoration ecology in this area, Namibia's National Biodiversity Programme has recently initiated the Southern Namib Restoration Ecology Project. For more information on this new project, please contact the author, Dr Antje Burke at EnviroScience, P.O. Box 90230, Klein Windhoek, tel/fax +264 61 22 3739, cel 081 124 0938, e-mail <enviroscience@iafrica.com.na>, or visit our website at <http://www.dea.met.gov.na/Programmes/Biodiversity/-snare.html>.