



News from the SANBio Desk...

Introduction

In 2008, SPGRC developed a project proposal through a working committee which included members from some NPGRCs, University of KwaZulu Natal, South African Centre for Scientific and Industrial Research (CSIR) and Southern African Network for Biosciences (SANBio) secretariat.

Steering Committee Meeting

A project proposal on the Review and Harmonisation of National and Regional Plant Genetic Resources Policies drawn from the overall proposal which was submitted to SANBio late in 2008, was presented during the SANBio Steering Committee which held its meeting in Pretoria on 7-8 May 2009.

The Committee meeting was devoted to the presentation of project proposals by scientists from various nodes/institutions such as CSIR, Malawi - Node for Fisheries, Mauritius - new Node for Bioinformatics, University of Namibia - Node for mushroom farming, SPGRC - Node for plant genetic resources conservation, University of the North in South Africa - Node for Indigenous Knowledge, and Zambia National Institute for Scientific and Industrial Research/University of Zambia (NISIR/UNZA) - Node for livestock production/diseases.

The members were informed that in 2005, all proposals were merged to form one regional proposal which was then presented to Finland, amounting to about EUR 3 Million. This amount was approved in addition to R 9Million that was received from the Republic of South Africa. The meeting was organized to discuss the utilization of these funds. It was emphasized that projects should ultimately benefit the region and should engage at least three SADC countries and also have a partner from Finland.

Conclusion

At the end of this fruitful and informative meeting, seven regional projects were approved. The SPGRC project on review and harmonisation of national and regional plant genetic resources policies was given approximately US\$ 200,000 for the 3-year project period, and will cover all SADC Member States. The project is being led by SPGRC Head and its first inception/planning meeting with stakeholders is scheduled for July 2009.

It was emphasised at the meeting that projects are to partner, where possible, with Finland institutions.

Zimbabwean On-farm Conservation and Community Seed Banks Revisited

by T. Lupupa - SPM - Insitu

The need to visit Zimbabwe emanated from discussions done during the 2008 SPGRC/NPGRC Planning meeting where it was felt that there is need to assess the relevance of Community Seed Banks (CSBs) to on-farm conservation.

1. Objective

The major objective was to assess the relevance of CSBs to on-farm conservation. It was anticipated that there would be a chance to see the sites with live material in the field genebanks but due to time limitations, that was not achieved.

The Senior Programme Manager - In-situ, Ms Thandie Lupupa paid a courtesy call to the Director of the Department of Agricultural Research for Development (DAR4D), Mrs D Hikwa who reiterated that CSBs are mainly manned by an NGO - CTDT



Farmer conservationists explaining strategies used in CSBs

Continued on page 3



Assessment and management of Red List and endemic plant species at Rössing Uranium mine, Namibia

Sonja Loots
Curator/Red List Officer
NPGRC - Namibia

Summary

Field assessments were carried out on 35 populations of *Adenia pechuelii* (Engl.) Harms and 19 populations of *L. ruschiorum* (Dinter & Schwantes) N.E.Br. over their distribution range in Namibia.

A total of 2625 individuals of *A. pechuelii* were recorded. The Rössing Uranium mine (RUL) contains no more than 8% of the total population of *A. pechuelii* in Namibia. A total of 8367 individuals of *L. ruschiorum* were recorded over the distribution range of the species, of which no more than 10 to 15 % occurs at RUL. The density of plants in the monitoring square at Tailings 3 was one of the highest amongst the populations assessed. The overall density of populations at Tailings 3 and 5 were among the highest of all the *L. ruschiorum* populations recorded. Most of the sampling points regarded as important for the conservation of *L. ruschiorum* are located directly north of the tailings dam.

The Red List status for *L. ruschiorum* remains unchanged at Least Concern. The status for *A. pechuelii* is down-listed from Near Threatened to Least Concern.

Introduction

As part of their Biodiversity Action Plan and their commitment to achieve a net positive impact on biodiversity, and consistent with specific recommendations made by Burke (2005), the Rössing Uranium mine (RUL) undertook to identify and assess plant species of conservation concern within their license area. As part of the Rio Tinto mining group, they are committed to the conservation of threatened and endemic species as well as high priority conservation areas. They also support local, national and global conservation initiatives. A concept note for a project was therefore developed by the National Botanical Research Institute (NBRI) in collaboration with RUL, the Rio Tinto mining group and the Royal Botanic Gardens (Kew), in order to conduct Red List assessments and to devise management and monitoring plans for the targeted species within the license area.

Field work was therefore undertaken from 2006 to 2008 to assess populations of *L. ruschiorum* and *A. pechuelii* throughout their distribution ranges in Namibia in the partnership between the mine, NBRI, Kew and Rio Tinto. Upon completion of the work, there should be more clarity about where the densest populations are and how the populations at RUL compare to the rest of populations throughout the two species' distribution ranges.

Methods

A data sheet was designed for the two species, on which all relevant data for each site were recorded, including a site description and relevant habitat information. The data recorded on the data sheets were entered into an MS Access database that was developed in collaboration with RBG Kew. This allowed the data to be queried for mapping and analysed to produce results.



At each population, *L. ruschiorum* plants were temporarily marked with coloured markers to determine the number of plants and the boundary of the population (Fig 1). At each sampling point, the area in which the *L. ruschiorum* occurred was measured using the track log function of the GPS. The track log was set up to record one set of coordinates every second. The tracks were downloaded onto the Garmin Trip and Waypoint Manager, from where they were imported into Arc View version 3.1 to produce maps. The number of *L. ruschiorum* individuals within the measured area was physically counted. This enabled the determination of the density of the population by dividing the number of plants by the size of the

Continued on page 4

Continued from page 1

(Community Technology Development Trust) which works in collaboration with the NPGRC. She further mentioned that there was once a programme which was spearheaded by the Ministry of Agriculture called Zondera Moambo, which was mainly implemented through local community leadership. The chiefs were in charge of coordinating distribution of farm inputs, allocating communal farmland where communities would jointly farm the land, produce stored at the chief's place who then distributed it to vulnerable families in the community. This programme was to promote access to food for the destitute families. She said on-farm and Community Seed Banks seem to be similar to the Zondera Moambo programme and has to be promoted. She said seed banks will enable farmers to plant in time and have access to food in the region.

2. Visits to Community Seed Banks

(i) *Uzumba Maramba Pfungwe (UMP) CSB and Small-Scale Seed Producers*

The farmers received the team of visitors and after officiating the meeting with a prayer and introductions, a tour around the genebank was made followed by viewing of crop diversity exhibits that were displayed by the farmers to show how they conduct their annual seed fairs.

Following lead questions that were formulated and circulated to CTDT and the NPGRC prior to the visit, a group of farmers were identified to provide information about the history behind the establishment of the CSB.

From the discussions with the farmers' group, the following information was gathered:

- Establishment: 1997 after experiencing a severe drought in 1991/92 where a lot of material was lost. Farmers were hit hard and forced by circumstances to eat

even material that was earmarked to be planting material for the next planting season. Construction done through the assistance by the CTDT which provided building material and the farmers provided labour;

- Membership: 1,496 members (709 females and 687 males);
- Collection Mission: The first joint mission by farmers, NGO and the NPGRC was done in 1999 where samples were duplicated at the NPGRC for safe keeping;
- Material Classification: Done in 3 major categories: Family collections – where family samples are stored to reflect the diversity at household level and for safe keeping; General collections – consisting of general collections from all the sites covered during the germplasm collection missions; and Bulk collections – conserved for planting in the following season. It was observed that most containers for the bulk collections were empty indicating that material was



A typical CSB set-up

Continued on page 7

Continued from page 2



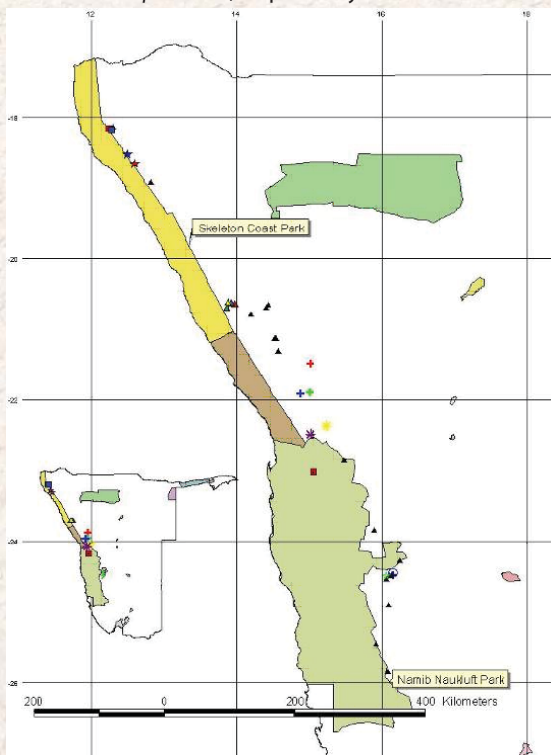
area to get the number of plants per m², e.g. 50 plants in 100m² = 0.5 plants / m². A 10m x 10m (100m²) square, marked with 4 iron droppers was established over the densest part of selected populations to serve as a long-term monitoring squares (Fig.2).

A. pechuelii plants were recorded individually. The density of all *A. pechuelii* populations were calculated using the Nearest Neighbour method (Cottam and Curtis, 1956), a plot-less sampling method and "Density from Distances" (Henderson and Seaby, 1999), a software programme that calculates density using plot-less density estimators upon entering of the data.

Soil samples were taken at 52 sampling points and brought back to the National Plant Genetic Resources Centre (NPGRC) where they were analysed for colour, texture and pH. Soil texture was determined using a manual process according to a standard procedure used by ICRAF. Soil pH was determined using a Hannah microprocessor pH meter. These data were used to determine the habitat preference of the target species.

Results

Figures 3 and 4 map the locations of the surveyed populations of *L. ruschiorum* and *A. pechuelii*, respectively.



During the course of the project some 35 populations of *A. pechuelii* were surveyed over its distribution range. A total of 2625 individuals of *A. pechuelii* were recorded, of which 221 are from the RUL license area. This means that the mine is the custodian of some 8% of *Adenia pechuelii* plants in Namibia.

19 populations of *L. ruschiorum* were surveyed. A total of 8367 *L. ruschiorum* plants were recorded over the distribution range of the species. Some 2011 individuals were recorded at RUL, giving the proportion of *L. ruschiorum* in the license area as 24%. But because some populations stretched over several square kilometres, it was not possible to count every single plant and therefore the percentage of plants occurring at the mine is probably closer to between 10 and 15 %.

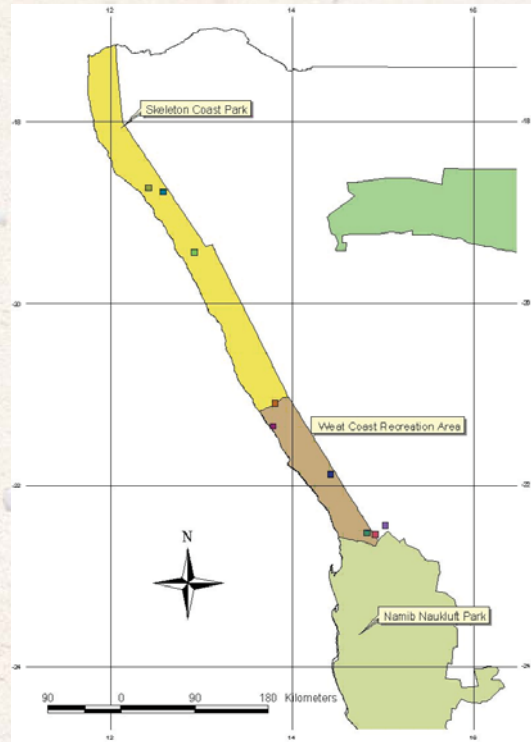


Figure 5 compares the number of *A. pechuelii* plants recorded at each population and shows that the population at the mine compares very well to other populations. Fig. 6 compares the number of *L. ruschiorum* plants recorded at every population and again shows that the population at the mine was one of the largest populations recorded.

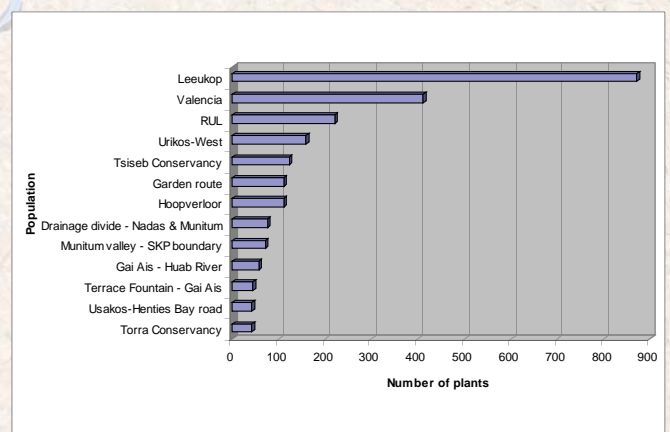


Fig. 5 Number of *A. pechuelii* plants recorded at each population

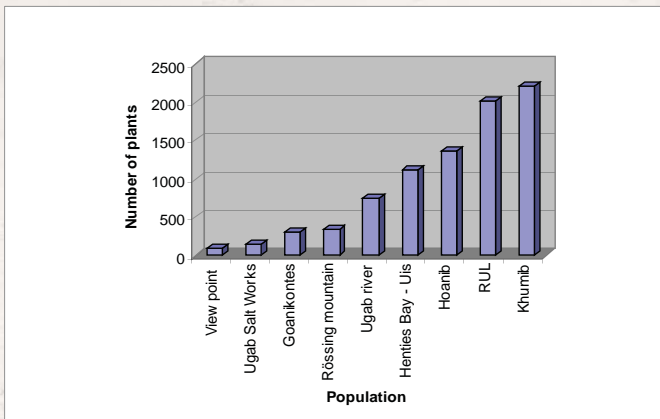


Fig. 6 *L. ruschiorum* population sizes compared across its distribution range

Figures 7 to 11 display the habitat preferences for *A. pechuelii*. Figures 12 to 16 display the habitat preferences for *L. ruschiorum*.

Figure 17 shows the difference in density between two populations of *A. pechuelii* that were mapped on a satellite image.

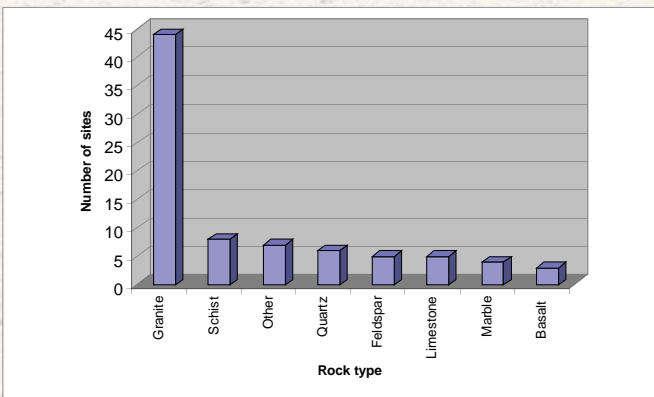


Fig. 7 *A. pechuelii* lithology preference

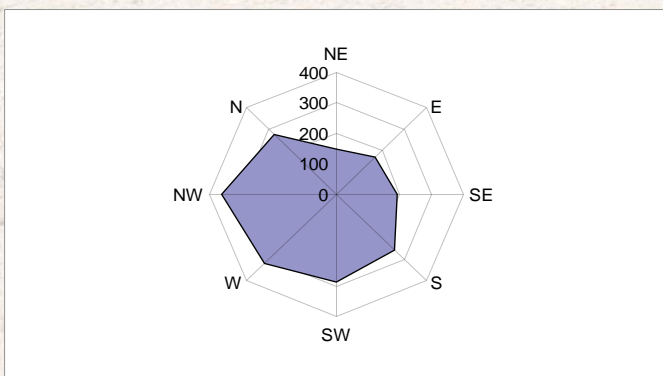


Fig. 8 Aspect preference for *A. pechuelii*

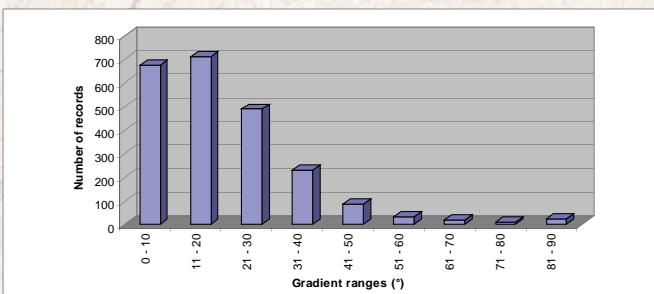


Fig. 9 Gradient ranges of *A. pechuelii*

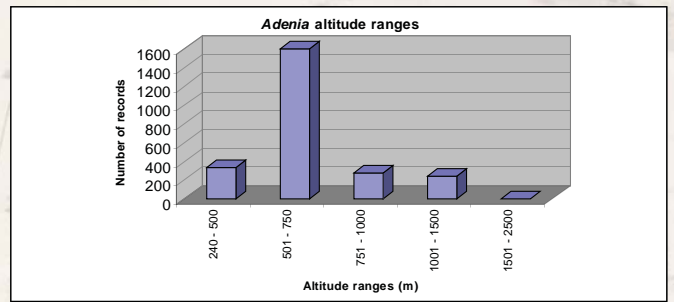


Fig. 10. Altitude ranges for *A. pechuelii*

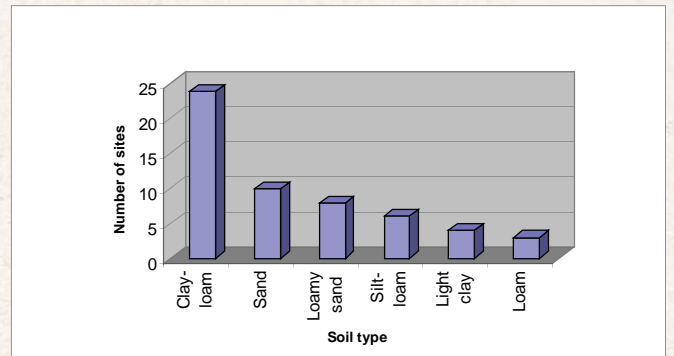


Fig. 11 Soil type preference for *A. pechuelii*

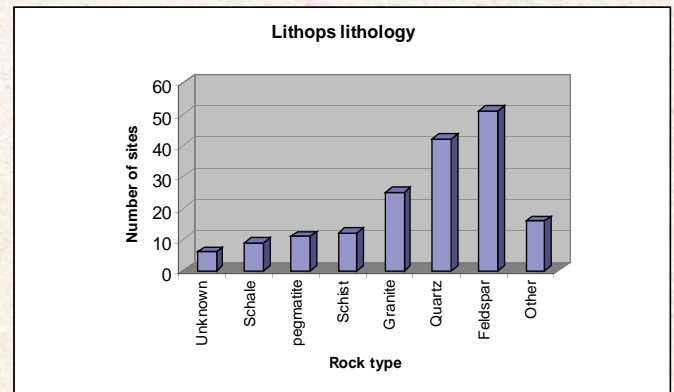


Fig. 12 Lithology preference for *L. ruschiorum*

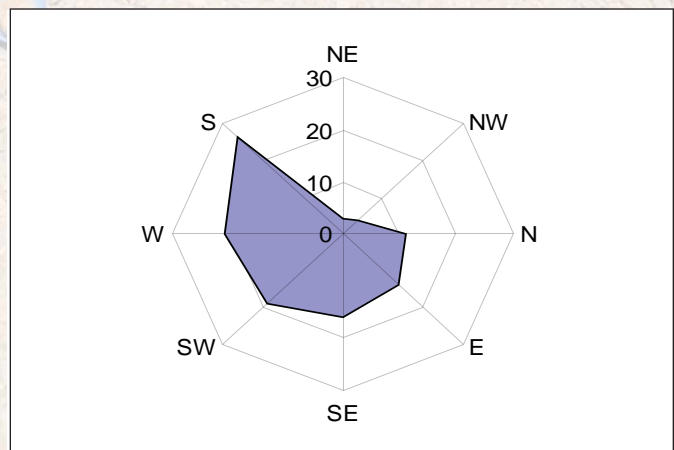


Fig. 13 Aspect preference for *L. ruschiorum*

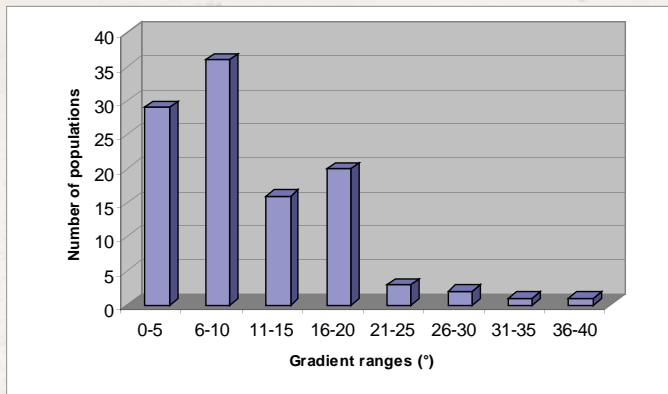


Fig. 14 Gradient preferences for *L. ruschiorum*

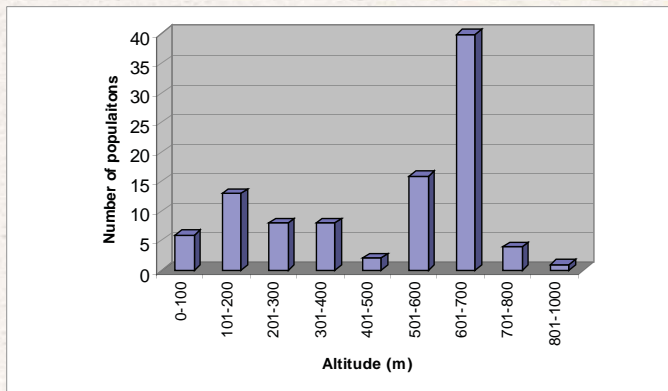


Fig. 15 Altitude ranges for *Lithops ruschiorum*

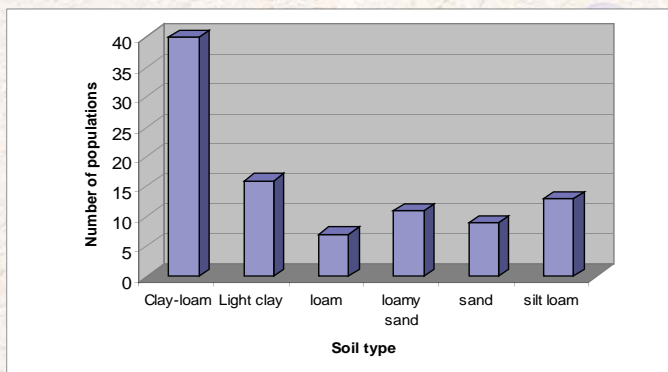


Fig. 16 Soil type preference for *L. ruschiorum*

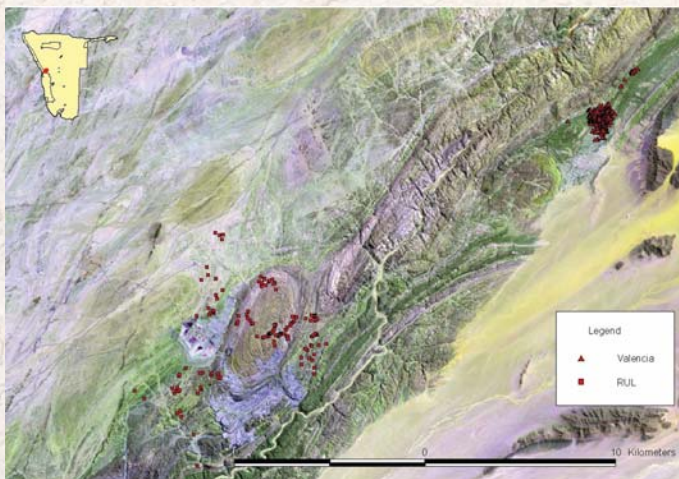


Fig. 17 Distribution of *A. pechuellii* at RUL and the prospective Valencia Uranium mine

Discussion

The fairly comprehensive field assessments conducted at the RUL also helped to explain the high density of *L. ruschiorum* to the northern side of the tailings dam. The research revealed that they are spread in a band running from north-east to south-west, with the tailings dam in the centre of this band. It appears therefore that the tailings dam was constructed in the middle of a dense *L. ruschiorum* population, thereby partially destroying its natural habitat. The dense clusters directly to the north of the tailings dam seems to be what remains of a once much larger population. This observation makes the conservation of these remaining *L. ruschiorum* very important. RUL therefore has an important responsibility to protect this area and the company has been pro-active by proclaiming it a “no-go” area. This essentially means that this area is protected from mining activities. Although a part of this population was destroyed by mining activities, the reduction is not enough to change the conservation status of the species. The category of Least Concern therefore remains valid

The new information that was accumulated for *Adenia pechuellii* meant that its conservation status is now down-listed from Near Threatened to Least Concern. The fact that the species is not threatened with extinction, does not mean that it is not of conservation concern. On the contrary, although it is difficult to determine the age of these plants, it is reasonable to assume that they are extremely slow growing and that large individuals may be several hundreds of years old. In addition, field work that was conducted suggests that seed setting is poor in all the populations that were surveyed which would result in poor recruitment as well. Indeed in most populations, less than 10% of the plants were small and in the long term, this may prove to be a threat to the survival of those populations. Populations with poor recruitment will be vulnerable to illegal collecting, the pachycaul trade and possibly climate change.

During the course of the project, both the NPGRC and the Millennium Seed Bank Project aimed to conduct germplasm collections of the two target species. No sufficient collection of *Adenia pechuellii* could be made as the plants do not often produce seeds, male and female plants often do not flower at the same time, some populations have skewed sex ratios and the fruits, which often have no seeds, are eaten by birds. A seed collecting guide was also developed by the MSBP to assist staff from RUL to identify, locate and collect seed from species of conservation concern that occur within the mine’s license area.

Conclusions

The support provided by Rio Tinto, RUL, the NBRI and RBG (Kew) to conduct Red List assessments has been particularly beneficial to the Namibian National Plant Conservation objectives as it provided a basis for the monitoring of populations of the two target species. The trend to set up monitoring squares will certainly be applied to other species of conservation concern, especially threatened species, as an ongoing activity of the Threatened Plants Programme of the NBRI and thus a baseline was developed for future monitoring of target taxa.

The project has provided an opportunity for RUL to make a valuable contribution to the conservation and management of two species of national conservation concern, both inside and outside their license area. It is hoped that the commitment by RUL and Rio Tinto will serve as an example to be followed by other mining companies.

The methods for estimating density of populations of small succulents such as *Lithops* species should be further investigated and if possible, applied to different genera of succulent plants.

Continued from page 3

already used up for planting. Rejuvenation of conserved material is carried out after every two years. Labels on the glass bottles were reflecting the collector's number, crop, variety (local or improved), date and name of farmer from where the material was sourced from. The sample size distributed to farmers is 500g;

- Income generation: at household level is mostly through commercial seed multiplication of open pollinated varieties (OPVs). Farmers sign contracts with seed companies to multiply seed for crops like cowpea, bambara, groundnuts, maize, sorghum and pearl millet. They also sell their produce during seed fairs;
- CSB Impacts: Farmers confirmed increased crop diversity due to the competitions held during seed fairs with families eating food from a broad diversity. The farmer who got a prize for the greatest diversity had 59 varieties and said he was able to produce this much through practicing mixed and intercropping. The facility has enabled farmers to plant in time. Overall, access to food is enhanced in the area and farmers do share seed with other neighbouring farmers;

- Conclusion:** Incentives in form of prizes awarded during seed fairs motivate the farmers to maintain the crop diversity. As farmers continue growing the vast diversity, the broad food base is maintained, malnutrition minimized, access to food improved and livelihood enhanced.

(ii) **Tsholotsho CSB**

The seed bank is located very close to the Agriculture offices and most trials for lines that are still under investigation are done in the farmers' fields. This does not deter the farmers in continuing to maintain their local varieties. Generally, the common crops are pearl millet and sorghum.

The CSB was established in 2007, financed by the CTD and currently with 1,497 members (993 females, 504 males). Reasons for establishing CSB were given as:

- To provide easy access to seed/planting material in order to plant early;
- Distribution of commercial seed is usually delayed, most farmers rely on their farm-saved seed which is stored in the genebank after every harvest and collected for planting early in the next planting season (farmer bulk collections).
- In case farmers experience crop failures, they then fall back to the general collections where they are given small quantities which they multiply for restoration.
- The seed bank supplements the national genebank. If material is lost at farmer level, they request for the duplicated material from the national centre.

TSHOLOTSHO COMMUNITY SEEDBANK MANAGEMENT COMMITTEE			
NAME	Ward	VILLAGE	POSITION
1 SIFISO NDLOYU	13 F	KHULUMUSENZA	CHAIRLADY
2 PHINEAS V. NCUBE	2 M	HLANGANANI	VICE-CHAIRPERSON
3 LOVEGIRL NDLOYU	9 F	SWABALANDELA	SECRETARY
4 BANABAS NDEBELE	2 M	HLANGANANI	VICE-SECRETARY
5 PHILIP TABOKA	13 M	KHULUMUSENZA	TREASURER
6 ROSEMARY MOYO	9 F	SWABALANDELA	COMMITTEE MEMBER
7 MAFRUIT NDLOYU	13 M	KHULUMUSENZA	COMMITTEE MEMBER
8 STANLEY DUBE	13 M	KHULUMUSENZA	COMMITTEE MEMBER
9 AMOS NJONI	12 M	ZAMANI	COMMITTEE MEMBER
10 SAMUEL NKOMO	12 M	THOKOZANI	COMMITTEE MEMBER

For effective management, CSB assigns responsibilities to elected Community Seedbank Management Committee

3. Conclusion

In Zimbabwe, Community seed banks store seed from a wide range of individuals and were established through the CTD. There are 3 seed banks in all but 2 were visited. Farmers at grass roots level are encouraged to conserve and utilize the local varieties at farmer level and this reflects the relevance of community seed banks to on-farm conservation. Seed or planting material is usually readily available at the required time, providing access to and control over seeds and strengthen local seed supply systems while ensuring that seed supply and diversity are maintained.



References

- Akçakaya, H.R. & Ferson S. 2001. *RAMAS Red List Threatened species Classifications Under Uncertainty Version 2.0*. Copyright © 2001 by Applied Biomathematics.
- Arc View GIS version 3.2a. Copyright 1992 – 2000. Environmental Systems Research Institute, Inc.
- Burke, A. 2005. *RUL's Biodiversity strategy: Biotope mapping, reconstruction of the pre-mining situation and assessment of biodiversity value*. Phase 2 report. 21 pp.
- Cottam, G. and Curtis, J.T. 1956. The use of distance measures in phytosociological sampling. *Ecology* 37 (3): 451-460
- Curtis, B.A. & Mannheimer, C.A. 2005. *Tree Atlas of Namibia*. Windhoek: National Botanical Research Institute. 688pp.
- Henderson, P.A. and Seaby, R.M.H. Copyright 1999. *Density from Distances (DfD)*. Version 1.1. Pisces Conservation Ltd. IRC House, Pennington, Lymington, UK.
- Loots, S. 2005. *Red Data Book of Namibian plants*. Southern African Botanical Diversity Report No. 38. SABONET, Pretoria and Windhoek. 124pp.
- Loots, S. 2005. Unpublished. Assessment and management of Red List and endemic species at Rössing Uranium Mine, Namibia. Rio Tinto / Kew / Rossing / NBRI partnership – concept note, project matrix and budget.
- National Herbarium of Namibia (WIND). 2009. SPMNDB Database. National Herbarium of Namibia (WIND), National Botanical Research Institute, MAWF, Windhoek, Namibia.

National Plant Genetic Resource Centres' Contacts

Centro Nacional De Recursos
Fitogeneticos, Avenida Revolução de Outubro, C P
10043, LUANDA, Angola
Tel: 244-2-325673
Email: cnrf@ebonet.net

Department of Agricultural Research,
Private Bag 0033, GABORONE, Botswana
Tel: 267 3668100, Fax: 267 928965
Email: cgwafila@yahoo.com, mmolefe@gov.bw

Centre de Recherche et Chef de Programme
National Conservation
INERA - Mvuazi
BAS - Congo (Democratic Republic of Congo)
Cell: +243-998-987238
E-mail: ineramvuazi@yahoo.fr

Department of Agricultural Research
P O Box 829, MASERU, Lesotho
Tel: 266 22 312395/326042
Fax: 266 22 310362
Email: maleoacm@yahoo.co.uk

Chitedze Research Station
P O Box 158, LILONGWE, Malawi
Tel: 265 1 707222, Fax: 265 1 707041
Email: genebank@malawi.net

Ministry of Agriculture & Food Technology
Horticulture Division, REDUIT, Mauritius
Tel: 230 4644857, Fax: 230 4644857, 46448749
Email: myboodoo@mail.gov.mu

Instituto Nacional de Investigacao Agronomica (INIA),
P O Box 3658, MAPUTO, Mozambique
Tel: 258 1 460255, Fax: 258 1 460074/460255
Email: iniagef@teledata.mz

National Botanical Research Institute
Private Bag 13184, WINDHOEK, Namibia
Tel: 264 61 2022010, Fax: 264 61 258153
Email: loots@nbri.org.na

RSA Plant Genetic Resources Centre
Private Bag X973, PRETORIA 0001, South Africa
Tel: 27 12 808 5387/9, Fax: 27 12 808 5383
Email: pgrc@nda.agric.za

Malkerns Research Station, P O Box 4
MALKERNS, Swaziland
Tel: 268-52-83178, Fax: 268-52-83360/490
Email: mrs@realnet.co.sz

TPRI
National Plant Genetic Resources Centre
P O Box 3024, ARUSHA, Tanzania
Tel: 255 27 250 9674, Fax: 255 027 250 9674
Email: genetics@habari.co.tz, mzeezi@yahoo.com

Mt. Makulu Research Centre,
Private Bag 7, CHILANGA, Zambia
Tel: 260 1 278380 / 278095
Fax: 260-1-278130
Email: mtmakulu@zamnet.zm

NPGRC of Zimbabwe
P O Box CY 550, Causeway,
HARARE Zimbabwe
Tel: 263 4 702519, Fax: 263 4 731133
Email: ngbz@mweb.co.zw