Conservation of biodiversity in the SADCC countries - possibilities and needs

O. Hedberg*

On the request of Dr Stig Blixt, NGB, I prepared for the SRGB Board meeting in Malmo in May 1990 a proposal for "Botanical Twin Project" to the Regional Plant Genetic Resources Center SADCC. I was then asked by the Board to go ahead with the planning and to visit all SADCC countries as a consultant to SIDA in order to develop the project. During a contact journey to 8 of the then 9 SADCC countries I explored the current situation concerning herbaria, botanic gardens, trained taxonomic botanists, herbarium technicians etc. and elaborated a more detailed draft, which was presented to the first Zambian National Workshop on Plant Genetic Resources in Siavonga and then submitted to the fourth SRGB Board Meeting in Lusaka October 15 - 18, 1990. The Board was agreeable to the project and asked me to complete the proposal and deliver it to SACCAR. Participation in the present meeting has given me the chance of giving, as I hope, a final touch to this proposal.

Background

The purpose of the SADCC Gene Bank is to safeguard future availability of indigenous plant genetic resources by identifying and preserving as far as possible all plants of current or potential interest in the participating countries. These activities aim not only at cervices and tubers but also at, e.g. fodder and forage plants, oil seed crops, cultivated, weedy and wild vegetables, wild fruits and nuts, ornamentals, medicinal plants and forest trees. Incidentally, according to a Draft Convention on Biological Diversity (UNEP/Bio. Div/INC. 4/2, 23 July 1991) expected to be adopted by the Brazil conference next year, conservation should comprise the maximum possible biodiversity. Preservation is envisaged not only through storage of seeds (1) but also through cultivation in botanic gardens and field genebanks (2), as well as through in situ conservation in national parks and reserves of various kinds (3).

Each of these three methods has its advantages and disadvantages. Ex situ conservation of frozen seeds as practised in conventional genebanks can hold large amounts of

* Department of Systematic Botany, Uppsala University, P.O. Box 541, S-751-21, Uppsala, Sweden.
samples easily available in a small space, but it requires considerable inputs of labour and energy, and it can only store part of the genetic variation in the parent population - and cannot conserve the coevolutionary environment. Ex situ conservation in field genebanks (botanical gardens) can be applied to plants with recalcitrant seeds but requires large resources of land and labour, and suffers the same limitations as frozen seed storage. In situ conservation in national parks and reserves is the least expensive method and maintains both intrapopulation variation and coevolutionary contacts. It therefore provides the best possibilities for long-term conservation of genetic resources in wild plants.

Each of the three conservation methods mentioned also requires its own agents. Ex situ conservation of seeds should of course be done at the genebank proper. Field genebanks for ex situ conservation should in most cases be attached to botanic gardens or arboreta. And in situ conservation in national parks and other reserves should as a rule be initiated and supervised by taxonomic botanists at national herbaria.

**Botanical documentation**

An essential prerequisite for meaningful conservation of plant genetic resources is adequate naming and full documentation of each sample - we must know what we conserve and why. This has sometimes been neglected in the past. Thus in the biggest genebank of the world, at Fort Collins in USA, "lack of description makes up to 95 percent of the collections practically useless for users and hampers collecting efforts" (Perlak & Rifkin, 1986).

In the original "Plan of Operation" for the SADCC Gene Bank it was planned to have in the SRGB building a herbarium for documentation, and the same thing seems to have been envisaged for most NPGRCs. This would, however, neither be practical nor economical. To be useful as a national documentation centre a herbarium must firstly be permanently supervised by competent staff so that its collections are protected against damage by insects, etc.; secondly have a fairly large number of collections from the area concerned for comparison. National herbaria of useful size exist in all SADCC countries, and the SRGB should not compete with these but collaborate with them and solicit the support they need to handle the systematic-botanical and documentation aspects of the genebank project for indigenous plants. Adequate naming of wild plant material has to be done - or at least checked - by competent taxonomic botanists, and each collection must be documented by a properly labelled reference herbarium collection ("Voucher"). For the SADCC Gene Bank each collection should be represented not only in the national herbarium in its country of origin but also in some other SADCC herbarium. To facilitate comparison to types and other authentic material it should also be represented in at least one European herbarium.
The botanical inventories and ethnobotanical studies of potentially useful wild plants envisaged for the Gene Bank Project are also best organized through the national herbaria. Field work of this kind, and working up of the resulting material, is part of their traditional task. Computerizing of data on distribution of and uses of wild plant species is also a natural part of the activities of national herbaria, and should be delegated to them.

Competent botanists are, however, very scarce in most SADCC countries and most herbaria are poorly supported. Many scientists now see the lack of taxonomists as the bottleneck in tropical plant research (Hoyt, 1988). Similar evidence is provided in Hedberg (1988).

One of the reasons behind this scarcity of competent taxonomic botanists in the SADCC countries is that the teaching in taxonomic botany has declined in many universities and biology students tend to specialize in other areas than taxonomy. There also seems to be a scarcity of suitable textbooks and a widespread lack of understanding of the fundamental importance of plants for the survival of man.

**Functions of National Herbaria**

The basic function of a National Herbarium is to hold a collection of adequately named and labelled herbarium specimens as documentation of the flora of the country. It should aim at having in due time a representative sample of each species occurring in the country. By help of this collection and a reference library of floras and textbooks its botanists should be able to name any plants brought in from the NPGRC or other government departments, or the general public. All holdings of the herbarium should be entered into a computerized index, which should also cover all earlier finds documented in published papers or mimeographed reports, etc. Finally the herbarium should organize together with other interested parties ethnobotanical and other inventories of the flora in insufficiently known parts of the country and assist in securing conservation of plant species and ecosystems found to need protection. In such matters it should always keep in contact with other herbaria within the network. Needless to say, each ethnobotanical collection should be documented with a properly labelled voucher specimen, duplicated in at least one other herbarium. It should also be underlined that each collection of seeds or other propagation material for the genebanks should be complemented with a voucher specimen for documentation in the national herbarium - to make possible checking of the determination and recollection of material.
Needs of National Herbaria

In a draft application for a SADCC Herbarium Network, I listed what I considered the minimum needs for each national herbarium to fulfill its functions, the most important of which are the following: adequate localities, herbarium cupboards in sufficient number, a large freezer for control of insect attacks, a four-wheel drive vehicle for field trips, sufficient ear-marked field-work grants, increased library grants and a computer with a programme for storing results of flora inventories. The staff should comprise at least two taxonomic botanists with M.Sc. or Ph.D. in systematic botany and two adequately trained herbarium technicians. At the moment most national herbaria fall short of these requirements - some of them seem to lack most of those resources. And although the needs may differ considerably between different countries there can be no doubt that forceful improvements of this documentation infrastructure is of fundamental importance for the success of genebank activities - as well as for conservation of biodiversity in general.

References

