

The end-users of botanical information

Scientific institutes need to show their relevance and be involved in applied research in order to obtain the funding that they need to operate. Botanical gardens and herbaria are no exception. Botanical gardens are able to show their relevance through education and awareness of conservation issues, sustainable plant use, and *ex situ* conservation programmes. Herbaria need to be able to provide tangible products and services to a range of end-users to prove their relevance. To do this effectively and efficiently, herbaria need to critically identify the possible end-users of botanical information and determine their information requirements.

The following sections of this publication consider who the end-users of botanical information are, what type of information they require, in what format it is required, and the top priorities of the end-users within the ten participating SABONET countries. At many of the national end-user workshops the participants divided up into breakaway groups to discuss the needs of the end-users.

In Namibia there were four groups, namely the (i) producers of taxonomic information, which included taxonomists from the herbarium and the museum; and the (ii) primary consumers or researchers who use taxonomic information to produce secondary biosystematic products. The remaining two groups were combined during the discussions and included (iii) secondary consumers, for example EIA consultants, who use taxonomic information but do not produce biosystematic products, and (iv) tertiary consumers, for example educators and the public, who use general biosystematic information (Irish 2003). The discussion groups in the majority of the other countries were randomly chosen and, owing to lower numbers, the end-users did not remain in their respective end-user categories. Using breakaway groups was a very effective way of discussing the needs of end-users as it allowed participants with similar needs to compare and discuss their requirements in smaller groups.

The time spent in these breakaway groups varied at each of the workshops. At the Angolan, Namibian, and South African workshops the participants spent the greater part of the workshop in these groups. At the Botswana and Mozambique workshops, half

the time was spent discussing end-user needs in breakaway groups. At the Lesotho workshop the participants only spent a quarter of the time in these groups. The workshops held in Swaziland, Zambia, and Zimbabwe followed a different format and no discussion sessions were held (Fig. 6).

Who are the end-users of botanical information?

The potential end-users of botanical information come from many disciplines. Some of them are obvious users of botanical information and use herbarium services regularly, for example, conservation bodies and environmental consultants, while others are less frequent users of botanical information. For an extensive list of the potential end-users of botanical information, see Appendix 4. For the purposes of this report, the end-users represented at the workshops were divided into 19 categories. Although some of the participants could be placed in more than one category, for the purpose of analysis, each participant was assigned to only one end-user category.

The number of participants at each national end-user workshop varied (Fig. 7). The end-user workshop in Namibia was a joint workshop with SABONET and the Biosystematics Working Group (BWG) and included end-users of both botanical and zoological information, which resulted in the higher numbers of participants. The majority of the participants at this workshop were providers of taxonomic information from the National Botanical Research Institute, Namibia, and the National Museum of Namibia. Other participants included individuals from government departments, tertiary institutions, agricultural institutes, international NGOs, and environmental consultants.

The widest range of end-users attending the national end-user workshops was found at the Angolan, South African, and Mozambican workshops. These workshops had representatives from fourteen (Angola and South Africa) and thirteen (Mozambique) end-user groups. Swaziland and Zimbabwe had the smallest range of end-users attending the workshop (Table 3).

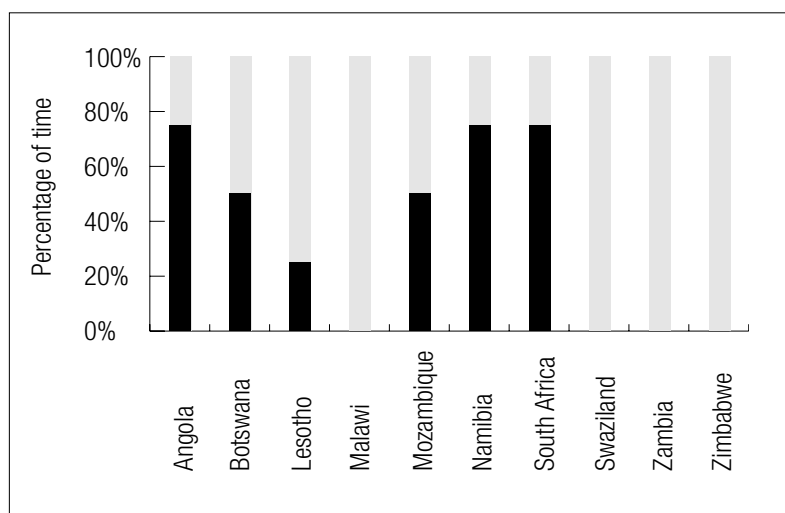
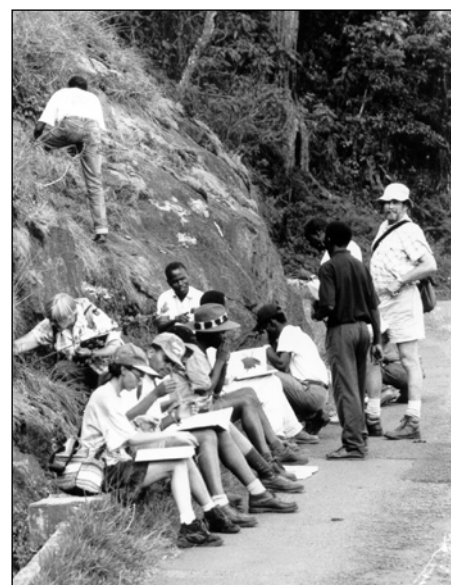
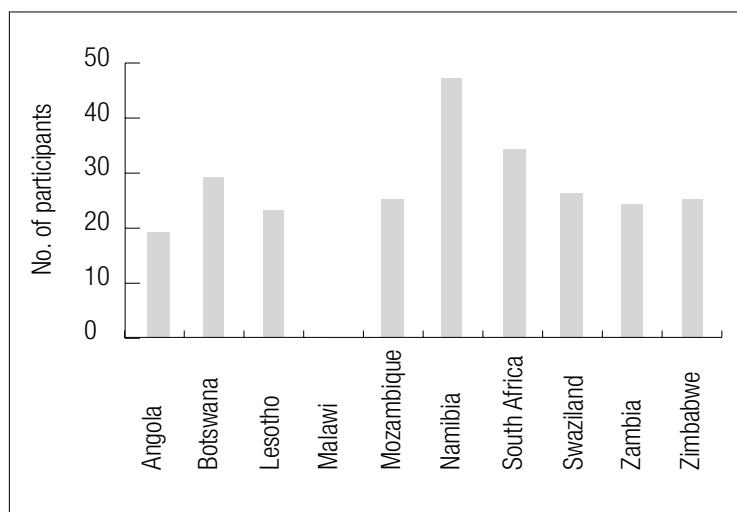


Figure 6. Percentage of time spent in break-away discussion groups at the end-user workshops. The black bars represent the amount of time spent in discussion groups.



Plant identification training course.



Aquatic plants identification training in Botswana.

Figure 7. Number of participants attending the end-user workshops in the participating SABONET countries.

Table 3. The number of participants represented in the 19 different end-user categories in each country.

	Angola	Botswana	Lesotho	Mozambique	Namibia	South Africa	Swaziland	Zambia	Zimbabwe	Total
Agricultural institutions/farmers	2	0	1	0	6	3	3	1	0	16
Applied educators (training centres)	0	3	0	1	0	0	0	0	22	26
Botanic gardens/museum	1	4	1	3	6	2	0	1	0	18
Botanical organisation/amateurs	1	2	0	1	1	1	0	1	0	7
Ecologists	1	1	0	2	2	2	3	0	0	11
Eco-tourism	0	0	0	1	0	0	0	0	0	1
Environmental consultants	1	1	0	0	3	2	0	0	0	7
Ethnobotanists	1	0	0	2	0	1	0	0	0	4
Government (conservation bodies)	1	0	5	0	1	3	0	0	0	10
Government (ministry)	1	6	7	2	4	1	3	1	1	26
Herbarium staff	1	5	2	2	10	2	2	1	0	25
International NGOs	1	1	1	2	3	0	1	1	0	10
National NGOs	0	0	2	1	0	0	4	1	0	8
Other - environmental lawyer/media	0	0	0	0	0	1	0	4	0	5
Other scientists	2	3	0	0	3	5	0	0	0	13
Secondary educators (school)	1	0	0	0	0	0	0	0	1	2
Taxonomists	4	2	1	4	4	4	4	0	0	23
Tertiary educators (university)	1	1	2	3	4	6	6	12	1	36
Traditional plant users	0	0	1	1	0	1	0	1	0	4
Total number of participants	19	29	23	25	47	34	26	24	25	252

In Zimbabwe, most of the participants attending the workshop were educators from agricultural training colleges, teacher training colleges, and universities. The management of the National Herbarium and Botanic Gardens in Zimbabwe decided that one workshop would not give a good representation of the end-users and it would be better to run different end-user workshops for the different categories of users. Two of these workshops were held; therefore, the information that was obtained is biased towards a single end-user category. In Zambia, presentations on genetic plant resources and traditional health practices resulted in most of the information obtained at the workshop revolving around the requirements for these two groups. No breakaway discussion sessions were held at the workshop and this, together with the length of the workshop (one morning), meant that little time was available for discussion.

Overall, 252 end-users attended the nine workshops. The highest numbers of end-users attending the workshops were in the following categories:

- Tertiary educators—36
- Government officials—26
- Applied educators—26
- Herbarium staff—25
- Taxonomists—23

The high number of applied educators is attributable to the nature of the Zimbabwean end-user workshop. All of the end-user categories recommended in the Mid-term Review were represented in at least one country. An additional category, eco-tourism, was included in this list; however, this category was represented only at the Mozambican workshops. An environmental lawyer was present at the South African workshop. In Zambia, four media representatives were present. The range of end-users attending the workshops indicated that the information obtained and discussed was representative of the needs of the majority of end-users of botanical information and herbaria in the region.

What information do end-users require?

The requirements of end-users of botanical information differ in the participating countries. Appendix 5 provides a comprehensive list of all end-user needs that were discussed at the various workshops. The differences between the needs of taxonomists and other end-users of botanical information were clearly seen at the Namibian workshop. In this workshop the delegates were divided into those participants who were producers of taxonomic information (taxonomists) and those who were users of taxonomic information. The producers were concerned with infrastructure, curation of the collection, staff training, and defining government policies. Improvement in all these areas would result in the efficient running of herbaria and more effective production of information for other end-users. As a result, if taxonomic priorities were met, many of the end-user priorities would also be met.

The end-user requirements have been divided into 12 main categories. Appendices 6a, 6b, and 6c provide summaries of the data used in the following points.

1. Standardised species lists and updates of name changes

Species lists, checklists, and inventories should form the basis for most of the information that is produced by herbaria. Without this type of information, many of the end-user requirements can-

not be met. Most of the participating countries indicated the importance of this requirement, but only four—Botswana, Mozambique, Namibia, and South Africa—gave it a high priority.

In South Africa, it was suggested that the species lists should be updated annually in hard copy and should be updated continually and made available in electronic format on the Internet.

These two needs can only be achieved if funding is available, the required technology is functional, and regions have been adequately sampled to ensure that herbaria are well stocked and representative of the region. Suitable library facilities, equipment, and trained staff are also required (Steenkamp & Smith 2002).

2. Plant identifications

Plant identification is one of the best-known functions of herbaria. End-users in most of the countries recognised the importance of this activity. Most of them acknowledged that a fee should be charged for identifications and that this generally did not prevent end-users from using herbaria. Participants in Botswana and South Africa indicated that charging a fee could prevent end-users from using herbaria. South Africa suggested a change in the structure of fees so that the greater the number of specimens identified for a single end-user, the lower the fee per identification.

It was agreed that in most countries the length of time that it took to get information back from herbaria was a problem and could prevent end-users from using these facilities. Some people were concerned about the quality of specimens that herbaria required. The South African end-users suggested that a sliding scale be used so that the fees were higher for poor quality specimens and lower for better quality specimens.

To improve this service, additional trained staff members should be employed and herbaria should be adequately stocked and representative of the flora of the region (Steenkamp & Smith 2002).

3. Efficient library services and access to relevant literature

In order to function effectively, herbaria need libraries that provide access to current and historical literature. The majority of the end-users were aware of this. South Africa suggested that new literature be made available on the Web and that herbarium libraries put older literature onto CD-ROM or onto the Web for easy access.



Plant identification in the field.

This requires a number of things, including an increase in library staff and the procurement of computers and scanning equipment. Internet access is needed, library holdings must be accessioned and accessible, and a comprehensive journal subscription must be made available (Steenkamp & Smith 2002).

4. Expansion of collections

Many of the functions of herbaria, for example, plant identifications and the production of species lists, can only be achieved if there are suitable reference collections within the herbaria. It is imperative that collecting trips be conducted on a continual basis. South Africa and Swaziland saw collecting and expansion of herbarium collections as being very important, while other countries, for example Namibia, placed this need much further down the list.

South Africa suggested that the National Botanical Institute (NBI) be responsible for organising and coordinating field trips to help improve collections in all South African herbaria. They suggested that amateur botanists and conservators should be trained in correct and ethical plant collecting practices and that collection permits needed to be more easily accessible. It was also suggested that an annual meeting be held to determine the progress of collecting trips in the country.

To achieve this, more staff is needed to process the specimens, more floor space, cabinets, additional collecting equipment, and sufficiently maintained vehicles for fieldwork are required (Steenkamp & Smith 2002).

5. Effective curation of collections

Effective curation is needed for the smooth and efficient running of herbaria and without this, some of the other end-user needs, for example plant identifications, could not be met. South Africa suggested that a herbarium management system be developed to assist with the manner in which herbaria function. They suggested that this system should include an accession register, determination lists, checklists, lists of names, cupboard lists, lists for permit-granting bodies, as well as loan lists.

A taxonomic database for herbarium staff should also be available including names, distributions, images, photographs, line drawings, and literature references. There is a mini PRECIS system currently available, but it is limited to archival, cataloguing, and labelling functions. While taxonomists in Namibia considered



Preparing herbarium specimens in the field.

curation to be a top priority, this was not the case for the other end-users in the country.

Efficient functioning of a herbarium management system would require adequate computer hardware and additional programme and software developers (Steenkamp & Smith 2002).

6. Computerised information and products

End-users in some of the countries, for example South Africa, expressed the need for a web-based or electronic (CD-ROM) integrated botanical information system. It was suggested that this system should include a literature database (journal details), and a practical, easy-to-use "Quick Identification Guide" based on species lists, with digital images, scientific names, synonyms, distribution data, specimen images (type and representative) and some literature on the taxa.

The NBI agreed that this was probably the most important end-user need, but the costs of such a project are very high as it requires intensive taxonomic research to generate the information that is required. Funds for this type of research and for suitably trained taxonomists to complete the task within a reasonable time are scarce. There is no infrastructure present to run such a system, while additional IT personnel, as well as highly trained herbarium and data capture staff, are needed. Other requirements include equipment to scan specimens, digital images of all taxa, adequate sampling, existence of research projects, and adequate library information (Steenkamp & Smith 2002).

In Namibia, the end-users recommended a similar system, which they called a "one-stop-shop". This would provide a way of communicating information to the end-users, for example, on permits and regulations for collecting of material, collecting techniques, herbarium standards, and information on under- and over-collected areas or groups. The taxonomists expressed their concern about the quality of specimens collected by non-taxonomists (Irish 2002).

In Swaziland, the end-users suggested that an electronic identification service would be a useful tool.

7. Suitable infrastructure to house herbarium collections

In Namibia, taxonomists saw the lack of infrastructure, the scarcity of buildings and the expense of their maintenance, as well as insufficient floor and cabinet space, as serious problems. This was less of an issue for the other end-users in that country. Unfortunately, without these basic facilities, taxonomists are unable to provide end-users with the information that they require. The end-users in Mozambique suggested that smaller herbaria should be established in the country, especially in the central and northern regions. In Lesotho, it was suggested that one of the three herbaria in the country be upgraded to the status of a national herbarium.

8. Field guides and general information

Many of the end-users indicated that popular literature in the form of guidebooks and the production of lists of species lists with common and local names was the responsibility of herbaria. In Namibia, taxonomists stated that this was outside their field of expertise. They said that, although they were prepared to provide

the information, scientific writers and linguists (for local names) should do the production of publications (Irish 2003).

Unfortunately, there is usually insufficient institutional funding available for these types of products.

9. Taxonomic and related research

The majority of end-users considered taxonomic research and the resulting scientific publications as being important. In Namibia, only taxonomists saw this as an important requirement. No taxonomic publications are being produced locally in Namibia. Instead, foreigners are describing most of the Namibian taxa, although usually with the co-operation of Namibian institutions. This raises doubts over long-term sustainability, and it was suggested that if the amount of time taxonomists spent on administration duties was reduced, more time could be spent on writing and preparing manuscripts for publication (Irish 2003).

All of the countries indicated that having accessible research facilities and current information encouraged end-users to use herbaria. Related issues that included research on endemism, habitat requirements, life histories, indicator species, medicinal plants, and alien species, were also considered important. Other needs included information on plant distribution and vegetation maps.

End-user requirements included determination of plant conservation status, the production of Red Data Lists, biodiversity research, and plant propagation information. In Namibia, taxonomists feel that they cannot undertake many of these aspects of research because of financial and time constraints. They suggested that researchers from other disciplines should be responsible for much of this type of research. In most cases they would be prepared to provide the relevant information and to co-operate with public relations exercises (Irish 2002).

10. Environmental education

The end-users of Angola, Botswana, Lesotho, and Swaziland indicated the need for outreach programmes to raise public awareness of herbaria and their functions.

The end-users in Botswana suggested that adequate signage in the herbaria and gardens, as well as a help desk providing botanical information was necessary. In Lesotho, many of the participants were unaware of herbaria, their roles, and the existence of SABONET. At the Namibian workshops, a large number of end-users were unaware of the products that the various biosystematic institutions offered. This suggests that there is a problem with marketing the existing products of herbaria.

11. Staff training

To meet many of the above-mentioned needs of end-users, suitably trained staff members are necessary. Without suitably trained staff, many of the end-user needs cannot be met. Surprisingly, only end-users in Mozambique, Namibia, and South Africa saw the training of staff as a top priority. The SABONET project has helped alleviate the problem of staff shortages to some extent, but in order to provide the services and products required by end-users, herbaria throughout southern Africa need more staff members.

Ironically, owing to the SABONET project, the higher qualifications obtained by herbarium and botanical garden staff resulted in better-paid positions in other organisations. This led to much of the knowledge being lost. Still, many of the SABONET contract staff have been given permanent positions in their respective herbaria. This has been difficult to achieve in Lesotho, because of a lack of funds and there is concern that much of the expertise developed during the SABONET Project will be lost.

Another problem is the lack of young taxonomists, and the rapid loss of expertise as older taxonomists retire and take their knowledge with them. Most training of taxonomists is done *ad hoc* and "in-house". It is evident that more of the initial primary training be carried out at tertiary institutions and that herbaria provide additional training and guidance to young taxonomists. The end-users in Namibia suggested that the tertiary institutions and the biosystematic institutions work together to improve the training of taxonomists.

End-users also required training for data-captors, para-taxonomists, and traditional healers. In South Africa, it was suggested that this need could be addressed by conducting courses at the NBI for various end-user groups.

12. Improved policies, law enforcement, and sustainability

Namibian taxonomists expressed concern over government policies. They suggested that if all biosystematic institutions were consolidated and operated from the same building, this would help to streamline processes involving permits, loans, and transfers. Swaziland suggested that stronger enforcement of flora laws was needed. In Lesotho, some participants were concerned over the state of the environmental report and that the government would not be able to sustain the SABONET Project.

Taxonomists in Namibia thought that the majority of the funding for services should come from the end-users themselves, while the other end-users thought that the Minister of Finance should provide the majority of the funding for biosystematics in the country. However, they were prepared to contribute towards this funding. (Irish 2003).

In what format is the information required?

The format in which the information is required by the end-users tends to differ among countries rather than among the end-us-



Inside a herbarium.

Table 4. End-user priorities in the participating SABONET countries. No information on the top priorities of end-users was supplied for Malawi, Zambia, and Zimbabwe.

Angola	Botswana	Lesotho
<ol style="list-style-type: none"> 1. Plant identification 2. Plant conservation status 3. Medicinal plants 4. Vegetation mapping 5. Guided visits (high schools) 6. Information on Red Data Lists 7. Information on endemic plants 	<ol style="list-style-type: none"> 1. Plant identification 2. Inventories (checklists) 3. Information service centre / help desk 4. Outreach Programmes 5. Library 6. Plant conservation status 7. Plant propagation methods 8. Plant use (toxicity, invasiveness) 9. Signage 10. Format of information 	<ol style="list-style-type: none"> 1. Awareness 2. Determining different end-users 3. Plant propagation 4. Information on Internet 5. Information for Environmental Impact Assessments 6. Information on Red Data Lists
Namibia	Mozambique	South Africa
<ol style="list-style-type: none"> 1. Institutional structure 2. Training for herbarium staff 3. Collection maintenance 4. Databases and information technology 5. Library 	<ol style="list-style-type: none"> 1. Species lists 2. Training for herbarium staff 3. Plant distributions 4. Database systems 5. Develop smaller herbaria 6. Expansion of collections 7. Library 8. Information on Red Data Lists 	<ol style="list-style-type: none"> 1. Up-to-date name lists 2. Standardised species lists 3. Integrated Botanical Information System 4. Expansion of collections 5. Plant identification 6. Library 7. Training of taxonomists 8. Training of data-capturers 9. General training 10. Herbarium Management System
Swaziland		
<ol style="list-style-type: none"> 1. Expansion of collections 2. Electronic identification service 3. Plant biodiversity research 4. Plant identification 5. Outreach programmes 6. Plant distribution data 		

ers. This is because of insufficient computer facilities in several of the countries that participated in SABONET. Many do not have reliable access to the Internet or e-mail. In these countries, most end-user information is required as hard copies like publications and information pamphlets. The end-users in Mozambique suggested the media (newspapers, radio, and television) as a format for providing information to raise public awareness of the role herbaria play, for example, in conservation issues. The Swaziland end-users indicated that occasional workshops and courses should be held for targeted groups of end-users.

What are the top priorities for end-users?

In many cases, the end-users in the participating countries require similar information, but their priorities vary (Table 4). The large number of taxonomists and herbarium staff in the Namibian workshop biased the top priorities of the end-users. Namibia's priorities mostly involved the development and maintenance of efficient and effectively functioning herbaria.

The top priorities of the end-users in South Africa, Mozambique, and Botswana were generally concerned with ensuring the provision of basic tasks within herbaria, for example, species lists, staff training, and relevant database information.

The top priorities of end-users in Angola, Lesotho, and Swaziland were related more to the actual products that herbaria produce, for example information on plant conservation status, medicinal plants, and Red Data Lists. Many of these end-user requirements could not be met without first dealing with the more fundamental requirements.

Future projects

Another topic that was raised at the end-user workshops was the question of whether future projects should be undertaken at regional level, in the same way as the SABONET Project, or at national level.

End-users in Angola and Lesotho preferred future projects to be on a national level.

Botswana, Mozambique, and Swaziland preferred them to be on a regional level to encourage the exchange of information between the countries. In Namibia, end-users also indicated that future projects be regional, but stipulated that these projects should be between SADC (Southern African Development Community) countries, or bilateral countries.

In South Africa, end-users indicated that future projects should

be on both a regional and national level depending on the envisioned outcome of the respective project.

Conclusions

The original questions posed to end-users of botanical information at workshops held in the SABONET countries resulted in a list of critical needs (in alphabetical order):

- Access to computerised information and products
- Efficient curation of collections
- Efficient library services and access to relevant literature
- Environmental education
- Expansion of collections
- Field guides and general information
- Improved policies, law enforcement, and sustainability
- Plant identifications
- Standardised species lists and updates of name changes
- Suitable infrastructure to house herbarium collections
- Taxonomic and related research
- Training of staff

It is evident that money is desperately needed to fulfil end-user requirements. It is necessary for the general maintenance of the buildings and for housing the collections. Funds are required to effectively curate collections and for the expansion of these collections. Training—in all aspects of herbaria activities—of both existing and new staff members, including taxonomists, technicians, and information technologists, is necessary if herbaria are to provide affordable products and services for end-users. Capital is required to produce commodities, like publishing hard copies, and developing and maintaining electronic versions of the information. The majority of the end-user requirements and priorities discussed in this report could be achieved if the relevant funding were available.

Not only financial constraints make it difficult to provide the relevant information to end-users, but also the fact that the diversity of the southern African flora is so immense that it has not been adequately studied and researched. For this reason, much of the information that is required by end-users is just not available (Steenkamp & Smith 2003).

An additional problem faced by the end-users is that the existing products and services of herbaria are not adequately advertised and publicised and the public is unaware of the existence of this information (Steenkamp & Smith 2003).

The end-user workshops have raised awareness about what the end-users of botanical information and herbaria expect. There is still a long way to go before all the information required by the end-users is available to them in the format that they require.

Other networks

This section briefly summarises some of the networks and projects that have been developed in other parts of the world, as well as their achievements. The majority of these programmes have similar aims and objectives to the SABONET project. Many of these projects are involved in capacity-building and technology development. This indicates the shortages of suitably trained staff and the lack of resources in herbaria in many developing countries.

BioNet-INTERNATIONAL

This is a global network for taxonomy that is “dedicated to creating sustainable mechanisms to overcome the ‘taxonomic impediment’ and promote self-reliance in taxonomic capacity in the developing world”. BioNet-INTERNATIONAL comprises sub-regional networks of developing country institutions or LOOPs (Locally Organised and Operated Partnerships). This results in a “south–south” relationship where taxonomic resources in developing countries can be pooled, shared, and optimised. Expert institutions in developed countries support the process, thus forming a “north–south” relationship. The effect is the transfer of information, skills, and expertise to LOOPs via donor-funded programmes. This network focuses on training, information transfer and communication, rehabilitation, establishment of biological collections and literature, development of new resources and technologies and the sustainable functioning of the LOOPs (www.bionet-intl.org).

SAFRINET is the SADC (Southern African Development Community) network of BioNet-INTERNATIONAL. It is a taxonomic capacity-building network that is concerned with living organisms, and includes identifying pollinators, species that enhance soil fertility, biological control organisms, pests, and diseases. This network covers bacteria, viruses and fungi, nematodes and other invertebrates. Some of the other LOOPs include EA-FRINET, the East African network; CARINET, the Caribbean network; and EASIANET, the East Asian network (www.safrinet.ecoport.org/).

Global Taxonomy Initiative

The Global Taxonomy Initiative (GTI) was developed by the Conference of the Parties (CoP) to the Convention on Biological Diversity (CBD) because of the existing taxonomic impediment and the effect this has on the management and conservation of biodiversity. The aim of the GTI is to improve decision-making in conservation, as well as sustainable use and equitable sharing of the benefits derived from genetic resources (www.biodiv.org/programmes/cross-cutting/taxonomy/).

In 2001, the GTI Africa Regional Workshop was held in South Africa. Forty-three delegates represented 32 countries, of which 23 were African countries, and 36 institutions or organisations. The aim of the workshop was to conduct a survey of the taxonomic institutions in Africa by focusing on needs assessments, collections, projects, collaboration, staffing, teaching of taxonomy, infrastructure, inventories or floras, priority taxa, taxonomic information, and obstacles.

Institutional running costs, the lack of staff, and the lack of project-related funding for research were seen as the most im-

portant problems preventing taxonomic progress. The workshop highlighted the taxonomic impediment in Africa and the need for taxonomic capacity-building (Klopper *et al.* 2001).

BOZONET

BOZONET is the Botanical and Zoological (Taxonomic) Network for Eastern Africa. This project was developed as a result of the SABONET project in southern Africa. In Eastern Africa, the taxonomic institutions deal with both botanical and zoological issues, so a joint network was established. The objective of BOZONET is “to support the countries of East Africa to remove barriers to the flow of relevant taxonomic information, from networked centres of expertise, to the range of end-users of such information, and to assist those end-users in the use of this information for the sustainable conservation of biodiversity, through processes of inventory, description, monitoring, and dissemination”. BOZONET targets three main categories of end-users (Rodgers & Khayota 2001):

- Conservation bodies
- The commercial sector (bioprospecting, tourism, and local community sustainability)
- Traditional knowledge in local communities

The focus of the project is on conserving biodiversity and on the sustainable use of resources.

The Australian Network for Plant Conservation

The ANPC network was established to promote and develop plant conservation in Australia. There are a number of objectives, including:

- Developing a network between a range of stakeholders in plant conservation from different organisations and individuals (government, industry, and community)
- Developing and maintaining regional groups
- Promoting co-operation and information exchange
- Contributing to the recovery and long-term survival of threatened plant populations, species, communities, and ecosystems
- Coordinating and linking efforts of members and others towards plant conservation
- Lending assistance in determining the conservation status of Australia’s flora
- Recommending guidelines for best practise of conservation activities
- Obtaining, collating, and distributing information relevant to plant conservation
- Fostering communication between members through publications and meetings
- Promoting education and training strategies and programmes

Other countries have adopted a similar model, for example Canada and Indonesia. The Indonesian Network for Plant Conservation (InetPC) aims to facilitate communication and co-operation between local conservation organisations, groups, institutions, and individuals together with international representatives working on the Indonesian flora (Mill 2002). This network produces a newsletter and botanical publications, it has a membership database, a resource library, and organises conferences, seminars, and informal meetings. It promotes public awareness, networking, and

co-operative research (www.bogor.indo.net.id/inetpc).

Royal Botanic Gardens, Kew

The Royal Botanic Gardens, Kew, have a number of projects within developing countries. Planta do Nordeste (PNE) is an Anglo-Brazilian project based in the semi-arid northeastern regions of Brazil. It is a collaborative, interdisciplinary research and information dissemination programme aimed at promoting the sustainable use of plants of the region for the benefit of local communities. There are a large number of Brazilian organisations participating in the programme, including Federal and State research agencies, universities, NGOs, organisations involved in alternative agriculture, forestry, and community development. There are three aims to the programme:

- Improving the knowledge of the region's plant life and methods of sustainable management.
- Strengthening the botanical expertise, research, and management of biological data in the area through training and the exchange of staff between Brazilian and United Kingdom organisations.
- Contributing to an improved quality of life for the region's people by putting new and old knowledge into practice (www.rbgekew.org.uk/scihort/pne).

Another programme is a project in the rainforests of western Cameroon. This project is a partnership between Kew and the National Herbarium in Yaoundé that provides training for staff through workshops, and computer and e-mail access, and logistic support. There is also an association with the Botanic Gardens at Limbé, where Kew horticulturists and botanists are helping to re-develop the gardens and herbarium (www.kew.org/scihort/wta).

Kew scientists are helping local botanists in Madagascar to catalogue species and identify conservation priorities. They are involved in mapping plant distributions and compiling checklists. This project relies on funds raised by the Threatened Plants of Madagascar Appeal. The capital is used to develop skills in botanical research, plant propagation, management of plant collections, and to provide resources, for example greenhouses, pots, and plant labels (www.kew.org/friends/madagascar/).

Royal Botanic Garden Edinburgh

The Royal Botanic Garden Edinburgh has been involved in projects with local botanists in various parts of the world, for example Chile, the Peruvian Amazon, Bhutan, and Laos, to help people to conserve plant life in their own countries. This included training and educating local botanists and students in plant identification, the use of herbaria, herbarium curation, and database systems. Many of these projects have also provided student scholarships (Maspero 2003).

Missouri Botanical Garden

The Missouri Botanical Gardens are involved in projects in a number of developing countries. One of these projects, the Vietnam Botanical Conservation Programme, aims at strengthening botanical research capacity in Vietnam by improving infrastructure, training in field techniques, herbarium management, plant identifications, taxonomy, indigenous plant use, and conservation and environmental awareness. Another similar project is found in Ecuador in South America where, in collaboration with the National Herbarium, training has been done to help strengthen the technical capacity for research, management, and conservation of the natural resources (www.mobot.org/mobot/research/).



Grass identification training course.

SABONET and the Global Strategy for Plant Conservation

The Global Strategy of Plant Conservation (GSPC) was developed by the CBD. The strategy is aimed at plant conservation, but also includes other aspects, for example sustainable use, benefit-sharing, and capacity building. The aim is to achieve the 16 targets—which are grouped under five themes—by 2010 (Table 5). Although the SABONET project started before the GSPC was developed, some of the goals achieved during the Project fall under the GSPC targets.

Considerable progress has been made towards achieving Target 1 of the GSPC, which states that “a widely accessible working list of known plant species, as a step towards a complete world Flora [be developed]”. SABONET has published a number of checklists for various components of the flora in southern Africa (Table 6).

The publication of the Southern African Plant Red Data Lists, which formed part of the *SABONET Report Series*, should help to initiate Target 2, which states that “a preliminary assessment of the conservation status of all known plant species, at national, regional, and international levels [be developed]”.

During the SABONET Project, target species were selected in the participating countries for *ex situ* conservation in the Threatened Plants Programme and workshops were held on threatened plant species, which will assist with the attainment of Target 8. This target states “60 percent of threatened plant species [should be] in accessible *ex situ* collections, preferably in the country of origin, and 10 percent of them [should be] included in recovery and restoration programmes”.

The training that resulted from workshops, internships, and student sponsorships during the SABONET Project will help to achieve Target 15, which states that “the number of trained people working with appropriate facilities in plant conservation [are] increased, according to national needs, to achieve the targets of this Strategy”.

The networks that have been established through the SABONET Project will assist in achieving Target 16, which states that “networks for plant conservation activities [are] established or strengthened at national, regional, and international levels”.

Table 6: Plant inventories and checklists produced as a result of the SABONET Project.

Inventory or checklist	Authors	Publication date
A checklist of Namibian plant species	Craven	1999
Conspectus of southern African Pteridophyta	Roux	2001
A checklist of Zimbabwean grasses	Chapano	2002
A checklist of Lesotho grasses	Kobisi & Kose	2002
Trees of Botswana: names and distribution	Setshogo & Venter	2003
Swaziland ferns and fern allies	Roux	2003
Checklist of grasses in Namibia	Klaassen & Craven	2003
A checklist of Zimbabwean bryophytes	Manyanga & Perold	2004
A checklist of Botswana grasses	Kabelo & Mafokate	2004
A checklist of Zimbabwean vascular plants	Mapaura & Timberlake	In press
A preliminary checklist of the vascular plants of Mozambique	Amude, Bandeira & Izidine	In press
A checklist of Zambian vascular plants	Phiri	In press
Swaziland Flora Checklist	Braun, Dlamini, Mdladla, Methule, Dlamini & Dlamini	In press
A preliminary checklist of the vascular plants of Botswana	Setshogo	In press
Plants of the Nyika Plateau	Burrows & Willis	In press
A checklist of Angola grasses / Checklist das Poaceae de Angola	Costa, Martins & Monteiro	In press
Seed plants of southern Tropical Africa	Leistner	In press
A preliminary checklist of the plants of Lesotho	Kose	In press

Table 5: Global Strategy for Plant Conservation (GSPC) objectives and targets.

Target	Target Description
a) Understanding and documenting plant diversity	<ol style="list-style-type: none"> 1. A widely accessible working list of known plant species, as a step towards a complete world Flora. 2. A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels. 3. Development of models with protocols for plant conservation and sustainable use, based on research and practical experience.
b) Conserving plant diversity	<ol style="list-style-type: none"> 4. At least 10 per cent of each of the world's ecological regions effectively conserved. 5. Protection of 50 per cent of the most important areas for plant diversity assured. 6. At least 30 per cent of production lands managed consistent with the conservation of plant diversity. 7. 60 per cent of the world's threatened species conserved in situ. 8. 60 per cent of threatened plant species in accessible ex situ collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes. 9. 70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained. 10. Management plans in place for at least 100 major alien species that threatened plants, plant communities and associated habitats and ecosystems.
c) Using plant diversity sustainably	<ol style="list-style-type: none"> 11. No species of wild flora endangered by international trade. 12. 30 per cent of plant-based products derived from sources that are sustainably managed. 13. The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted.
d) Promoting education and awareness about plant diversity	<ol style="list-style-type: none"> 14. The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes.
e) Building capacity for the conservation of plant diversity	<ol style="list-style-type: none"> 15. The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy. 16. Networks for plant conservation activities established or strengthened at national, regional and international levels.

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Global Taxonomy Initiative

www.biodiv.org/programmes/cross-cutting/taxonomy/

Indonesian Network for Plant Conservation

www.bogor.indo.net.id/inetpc

Royal Botanic Gardens, Kew—Planta do Nordeste

www.rbgekew.org.uk/scihort/pne

Royal Botanic Gardens, Kew—Wet Tropics Africa

www.kew.org/scihort/wta/

Royal Botanic Gardens, Kew—Threatened Plants of Madagascar Appeal

www.kew.org/friends/madagascar/

Missouri Botanical Garden

www.mobot.org/mobot/research/