
From NBI to SANBI: the biodiversity challenge.

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Introduction

South Africa is world renowned for its botanical diversity, with 21,693 plant taxa having been recorded in the country, of which 19,600 are indigenous and the remainder naturalized taxa. South Africa is also internationally renowned for its floristic diversity and high percentage of endemism. In particular, the Cape Floristic Region (CFR), one of the world's six floral kingdoms, is entirely contained in an area of 89,000 km² within the southwestern part of the country. The CFR – regarded by Myers (1990) as one of the world's "hottest" hotspots – contains c. 8,550 species of vascular plants, of which c. 73% are endemic to the region. The CFR is dominated by fynbos, a sclerophyllous, heath-like shrubland associated with nutrient-poor soils that cover most of the region (Cowling & Holmes 1992). Recent statistics on the flora of the Cape Peninsula mountain chain south of Cape Town show that in an area of 471 km², about 2,285 plant species are known to be indigenous (Helme & Trinder-Smith 2005). The Peninsula therefore has the greatest concentration of plant species (per unit area) within the CFR, with 161 plant taxa endemic to the area. The CFR became South Africa's sixth World Heritage Site in July 2004. Classified as a serial site, the CFR World Heritage Site comprises eight protected areas covering 553,000 ha. Kirstenbosch National Botanical Garden, as part of the Table Mountain National Park, was included – the first botanical garden in the world to be included within a natural World Heritage Site.

A synthesis of southern African succulent plants indicates that with 4,600 plant taxa, southern Africa contains c. 46% of the world's known succulent plants (Smith *et al.* 1997).

South Africa as a country contains a wealth of different habitat types, biomes and vegetation types. The biomes include savanna woodlands (including a small patch of *Brachystegia*-dominated *miombo* woodland in the northeastern part of the country), grasslands, afro-montane and coastal forests, Succulent Karoo (with the highest species richness recorded for semi-arid vegetation and about 50% of the plant species endemic to the biome), Nama-Karoo, coastal and marine vegetation (including mangroves), and some unique wetland areas. Recent research has refined the list of vegetation types for South Africa, with 440 vegetation types now having been mapped for the country.

One of the key developments that have taken place in the past few years has been the transition within South Africa of the National Botanical Institute (NBI) into the South African National Biodiversity Institute (SANBI) on 1 September 2004. This followed the promulgation of the National Environmental Management: Biodiversity Act (NEMBA) No. 10 of 2004 on the same date. This expanded new mandate has meant a widening of the scope of SANBI from purely botanical into broader biodiversity matters relating to the full diversity of the country's fauna and flora (with the creation of a new Directorate: Biodiversity Programmes, Policy and Planning Services), while maintaining its national network of eight national botanical gardens, as well as its taxonomic and ecological research programmes and the management of the three herbaria within South Africa. Part of this broader mandate includes reporting on the status of South Africa's biodiversity, co-ordinating to some extent the action between organizations and government departments, ensuring there is no duplication in research, providing guidelines, managing biodiversity information and advising the Minister of the national Department of Environmental Affairs and Tourism (DEAT) on areas that need specialist input.

This paper attempts to highlight the challenges faced by SANBI and its national botanical gardens in delivering on its expanded mandate and what SANBI has achieved to date.

Managed Network

The model chosen by SANBI in delivering on its broad mandate was the ‘managed network model’, whereby SANBI acts as the agent that will leverage expanded contributions from the entire biodiversity community in South Africa, rather than merely using its allocated resources autonomously and on its own.

SANBI Business Case

One of the first challenges faced by SANBI in addressing its broader mandate was to source additional funding from the National Treasury in order to be able to deliver on the expanded mandate as listed in the National Biodiversity Act. A Business Case was prepared in 2006 and after various iterations additional funding of R80 million, spread over a three-year period, was allocated to SANBI as from April 2007. This funding will enable the necessary restructuring of the organization and initiation of programmes as required by the new Biodiversity Act.

National Botanical Gardens

South Africa is one of the few countries in the world where a single institution manages a network of national botanical gardens (NBGs). Kirstenbosch National Botanical Garden (est. 1913 on the eastern slopes of Table Mountain) was the first national botanical garden to be established in South Africa. It focused entirely on the conservation of South Africa’s wealth of indigenous plants and the network has subsequently grown to incorporate eight national botanical gardens, spread across five of South Africa’s nine provinces (see Willis 2005). Efforts are currently in place to expand the national network by an additional four gardens in order to have a national botanical garden located in each of South Africa’s nine provinces. As ‘embassies of biodiversity and culture’, South Africa’s NBGs attract over 1.25 million visitors per annum, with Kirstenbosch receiving over 750,000 visitors annually.

The NBGs are situated in climatically different parts of the country, including predominantly winter-rainfall mediterranean climates (Kirstenbosch and Harold Porter NBG); semi-arid climates (the Karoo Desert NBG, situated at Worcester, with an annual rainfall of 250 mm, is the only truly succulent garden on the African continent as well as in the southern hemisphere); summer-rainfall subtropical to tropical climates (Lowveld and KwaZulu-Natal NBG); and South Africa’s interior plateau areas that can receive frost during the dry, cold winter months between May and August (Free State, Pretoria and Walter Sisulu NBGs). This range of climatic conditions means that different gardens are able to grow plants that might not be grown as successfully in other gardens without artificial structures having to be built. The national botanical gardens include large areas of natural vegetation representative of six of southern Africa’s seven biome units, namely Forest, Fynbos (characterized by the presence of ericas, restios and proteas), Grassland, Savanna, Nama-Karoo, and Succulent Karoo. The only biome not represented is the Desert Biome of the Namib Desert, which occurs almost exclusively in neighbouring Namibia. One of the challenges facing the national botanical gardens is to assess what animals occur naturally within their boundaries. While there is a good knowledge of the birds that frequent the gardens, lists of other faunal groups such as amphibians, reptiles, mammals, arachnids and insects are, for the most part, incomplete. Determining what animals are in the gardens is a process that has been started in several gardens through surveys and the involvement of societies and experts on the various faunal groups, from insects to mammals.

While the 1990s was the decade for the development of Kirstenbosch, assisted through the Kirstenbosch Development Campaign (which raised over R50 million between 1991 and 2003) and a range of sponsorships including private and corporate donors and the Botanical Society of South Africa, the first seven years of the new millennium have shown a shift in allocation of resources and the completion of new infrastructural developments in the various northern gardens.

Since 2001, SANBI's Gardens Directorate has received project funding allocations from the DEAT's Social Responsibility Programme (SRP) to develop new tourism infrastructure in all its national botanical gardens outside Kirstenbosch. Investment by DEAT's SRP in the development and upgrade of tourism infrastructure in SANBI's national botanical gardens since 2001 has exceeded R50 million – equivalent to the amount raised for the Kirstenbosch Development Campaign projects from 1991 to 2003. While creating employment and developing skills of people employed through the various projects, these facilities are intended to expand SANBI's environmental education programme (currently operational with dedicated facilities in five of SANBI's eight gardens) and to improve tourism infrastructure and revenue generated by the Gardens Directorate through both increased admission fees and rentals. To date, over 135,000 person days have been worked on SANBI's various construction projects involving the temporary employment of over 2,000 people and the permanent employment of more than 80 people required to operate and maintain the new buildings and facilities. It is estimated that by the time all current projects are completed by the end of 2007, over R16 million will have been spent on community wages during DEAT's SRP projects in the various NBGs.

The hosting of events, particularly music concerts, in the Gardens has become increasingly important in generating income as well as in attracting increased numbers of visitors from a broad cross-section of South African society. The events hosted in the various gardens also provide visitors with an opportunity to learn about South Africa's indigenous plants, including their value, conservation status and uses.

All eight gardens are situated in or very close to densely populated urban areas and are therefore relatively easily accessible to a broad and diverse audience. Since the inception of Kirstenbosch in 1913, the gardens have been supported by the Botanical Society of South Africa (BotSoc), a non-governmental organization whose mission is to win the hearts, minds and material support of individuals and organizations, wherever they may be, for the conservation, cultivation, study and wise use of the indigenous flora and vegetation of southern Africa (www.botanicalsociety.org.za). Local branch members act as the 'friends' of the gardens and support both garden-based and *in situ* conservation efforts.

The 94-year partnership between SANBI and BotSoc, based on a shared vision, has certainly been mutually beneficial, and is set to continue and become even stronger, well beyond the anticipated centenary year celebrations planned for both organizations in 2013. BotSoc has 16 branches spread across the country and produces its regular flagship newsletter, *Veld & Flora* (known from 1915 to 1974 as the *Journal of the Botanical Society of South Africa*), that showcases to its members the Society's involvement in plant conservation and education activities countrywide as well as featuring stories and horticultural notes on southern Africa's indigenous plants and their uses. Since 1981, BotSoc has been publishing regional wild flower field guides to the indigenous flora of South Africa, and has to date sold over 100,000 copies.

Between 1993 and 2002, the Botanical Society has also published a series of Education Posters, with sponsorship from Old Mutual. This award-winning series had as its goal the provision of resource material (the poster and accompanying workbook) on each of South Africa's biomes and was linked to the school curriculum. It has been estimated that over 5 million learners have used the resource and it continues to be used by South African schools.

In 2002, BotSoc started the Conservation Unit (CU) in Kirstenbosch. Since this time the CU has been involved in biodiversity planning, actively integrating biodiversity in land use planning and environmental assessment,

developing a range of stewardship options for private lands and testing the implementation of these in pilot sites using appropriate incentive measures.

Interpretation

Interpretation, providing the link between a botanical garden and its visitors, has received increased support in South Africa's national botanical gardens in the past five years, and each of the gardens currently has a dedicated Interpretation Officer. All the gardens have dedicated interpretation themes and plans that assist in guiding their interpretive work. The natural areas in all the gardens include an interpreted self-guided hiking/walking trail.

Although the gardens do not have collections of animals maintained in enclosures or cages, the interpretive signage certainly does promote the links and awareness of the dependence between animals, people and plants. Interpretive labels in the various gardens include a range of indigenous South African languages, particularly the languages spoken in those areas where the gardens are located. Languages generally used in interpretive signage are English, Afrikaans and the local African language. Both standardized permanent and temporary interpretive signs are used in South Africa's national botanical gardens. SANBI has also standardized the directional signage used in the various national botanical gardens.

A range of natural history courses are regularly arranged for members of the public in SANBI's gardens during weekends, covering topics such as spiders, bats, snakes, scorpions, trees, wild flowers and a range of related topics. Using the gardens as a base, these courses provide an opportunity to share knowledge of South Africa's indigenous biodiversity with members of the public.

The development of demonstration gardens featuring useful plants and medicinal plants has been one of the key activities of the NBGs during the past 10 years. Many gardens now include traditional structures, such as huts and cooking shelters, that are surrounded by plants traditionally used by South Africans, thus raising public awareness about the traditional use of various plant materials. Interesting demonstration gardens recently developed in Kirstenbosch include 'Weeds South Africa gave the World' and the 'Garden of Extinction', the latter illustrating South African plants threatened with extinction in their natural habitats. The benefit of the demonstration structures and gardens is that they can be used to share information first-hand with learners and other visitors to the gardens.

One of the challenges facing the national botanical gardens is a way to enhance their position as the public face of SANBI and showcase the organization's diverse activities, partnerships and achievements to visitors and the public. Messages about the importance of biodiversity and the need to conserve our natural ecosystems should be bold, simple and clear.

Environmental Education

While it is quite common for school curricula to include aspects of the diversity of animals and plants while exploring the concept of 'life' for young learners, South Africa's recently adopted Outcomes-based Education (OBE) system takes a much bigger step in introducing learners to biological diversity and conservation. Grade 9 learners (approximately 14-16 years of age) must understand the specific term 'biodiversity'. In many cases, their curriculum includes compulsory aspects such as genetics, population dynamics, evolution and paleontology and greatly promotes learners' awareness and appreciation of South Africa's unique biological resources.

SANBI's environmental education programme includes both garden-based education programmes as well as sponsored outreach greening programmes involving previously disadvantaged schools. Sponsors include the National Lottery and the DEAT.

Outreach has become a primary focus of SANBI's environmental education programme during the past decade, stimulated in 1995 by the sponsorship of a bus to bring learners from previously disadvantaged schools on the Cape Flats to Kirstenbosch. To date, over 100,000 people, young and old, have made use of the Kirstenbosch Bus and outreach programmes. Since 1994, SANBI's environmental education programmes have provided guided educational visits to more than 150,000 learners, many of whom visited the gardens for the first time. In 2002, SANBI's education programmes expanded to the Walter Sisulu, Pretoria, Lowveld and Free State NBGs. This expansion was made possible through funding provided by DEAT for the erection of new environmental education buildings and associated offices.

SANBI Biodiversity Series

SANBI started a new in-house publication series called the *SANBI Biodiversity Series* in March 2006. To date, five numbers have been published in the series, which aims to publish occasional reports on projects, technologies, workshops, symposia and other activities initiated by or executed in partnership with SANBI.

Bioregional programmes and strategic partnerships

South Africa has a long history of biodiversity research, awareness and conservation action. With the change of government and democratization in 1994, innovative ways of integrating biodiversity with development needs have been developed. Within the past few years, SANBI has been instrumental in developing and facilitating bioregional programmes in various parts of South Africa. Bioregional programmes are defined as biome-wide biodiversity initiatives that incorporate an agreed vision, measurable targets and an action plan for co-ordinating a range of multi-stakeholder projects integrating biodiversity conservation with development and social priorities. The programmes involve a systematic conservation planning process and implementation of these plans through projects with participating stakeholders.

SANBI is the management agency for the Cape Action for People and the Environment (C.A.P.E.), a multi-partner programme that aims to conserve biological diversity in the CFR and ensure that the people of the region participate and benefit. The C.A.P.E. Co-ordination Unit is housed at Kirstenbosch, and together with other biodiversity conservation groups, constitutes a dynamic environment for research, planning and action directed at sustaining the CFR for future generations. The C.A.P.E. partners work across the fynbos ecoregion, from lowlands and mountains to wetlands and coastal and marine environments, create awareness and take the lead in projects designed to overcome obstacles and seize opportunities to make a real difference. Some key conservation initiatives that are currently being developed by C.A.P.E. include the Greater Cederberg Biodiversity Corridor, Garden Route Initiative, Baviaanskloof Megareserve, Gouritz Initiative, Agulhas Biodiversity Initiative, and the West Coast Biosphere Reserve. Most of these initiatives involve partnerships between landowners, local communities and authorities, non-governmental organizations and formal conservation bodies. These initiatives are linked to the recently published National Spatial Biodiversity Assessment (NSBA; Driver et al. 2005), the first ever, comprehensive spatial assessment of biodiversity for South Africa. The challenge that lies ahead is to translate the biodiversity priorities identified in the NSBA into conservation action on the ground. As indicated by the authors of the NSBA, "this will involve mainstreaming biodiversity priorities in the policies, plans and actions of a wide range of stakeholders, both public and private, whose core business is not biodiversity, but whose day-to-day decisions will ultimately determine whether our development path is a sustainable one" (Driver et al. 2005).

A major component of C.A.P.E.'s strategy is encouraging industries that put pressure on the biodiversity of the CFR to develop and implement biodiversity best practices. One of the recent initiatives established with industries is the Biodiversity and Wine Initiative (BWI), a partnership between the South African wine industry and the conservation sector. The partnership aims to minimize the further loss of threatened natural habitat (particularly Renosterveld and Lowland Fynbos) within the CFR and to contribute to sustainable wine

production, through the adoption of biodiversity guidelines by the South African wine industry. The BWI presents a great opportunity to both the wine and conservation sectors. The wine industry benefits from using the biodiversity of the CFR as a competitive marketing advantage, and from contributing to natural resource management, as prioritized in the Wine Industry Strategic Plan (WIP). The conservation sector benefits from pioneering biodiversity best practices with the wine industry, which will result in conserving the CFR's threatened habitats. One of the key strategies identified for the BWI is the development of a biodiversity wine route where visitors are exposed to both the wine and the biodiversity experience of each participating producer. For example, guides from the local community would conduct tours of the natural vegetation, communicating the producer's story and the role of biodiversity conservation in sustainable wine production. It also provides an opportunity to create employment and develop a new ecotourism angle for South African wine tourism.

Other bioregional programmes being facilitated by SANBI include the Succulent Karoo Ecosystem Programme (SKEP; a multi-stakeholder 20-year programme focused on the Succulent Karoo and providing cross-border co-operation and links between South Africa and Namibia) and the Subtropical Thicket Ecosystem Programme (STEP; focusing on the conservation of the Subtropical Thicket Biome and associated vegetation types in the Eastern Cape) (Pierce et al. 2005). The vision of the STEP is that the people of the Thicket Biome take custodianship of their unique living landscape and together conserve, enhance and use their natural resources to ensure sustainable ecological processes and livelihoods, now and into the future. A National Grasslands Biodiversity Programme is currently being developed in South Africa to conserve the Grassland Biome, which extends into six provinces in South Africa. The goal is to ensure that the ecological services provided by grasslands are sustained and that they contribute to economic development and poverty alleviation.

Threatened Species Programme

South Africa has had a proud history of producing Red Data Books for plants (e.g. Hall *et al.* 1980; Hall & Veldhuis 1985; Hilton-Taylor 1996; Scott-Shaw 1999; Golding 2002). Two significant conservation projects coordinated and executed by SANBI, the Threatened Species Programme (TSP) and the Custodians of Rare and Endangered Wildflowers (CREW), are both supported by donor funding and will considerably enhance the country's ability to respond to the second target of the Global Strategy for Plant Conservation.

Launched by the SANBI in May 2003, the TSP aims to conserve South Africa's rare and threatened species. Its initial phase has focused largely on plant biodiversity, but the NBI's transition to SANBI marks the expansion of the activities to include the full spectrum of the country's biodiversity. The TSP aims to assess the threat of extinction to all c. 19,600 indigenous South African plant species using the IUCN's latest Red Data List categories (version 3.1) by December 2007.

One of the first faunal projects in which the TSP became involved was the Southern African Reptile Conservation Assessment (SARCA) launched in May 2005. Its primary aim is to produce a conservation assessment for the reptiles of South Africa, Lesotho and Swaziland within a four-year period (2005–2009). Other conservation assessments that have been initiated in partnership with other institutions within South Africa include the Southern African Butterfly Conservation Assessment (SABCA), a partnership with the Avian Demography Unit and the Lepidopterist Society of Africa, and the Southern African National Survey of Arachnida (SANSA) with the Agricultural Research Council.

Urban Conservation is a unit of SANBI, based at Kirstenbosch, that focuses on projects and partnerships 'beyond the garden fence' that look at biodiversity conservation from a community development perspective. The Urban Conservation Programme aims to:

- build public understanding of the biodiversity value in threatened urban environments;

- facilitate people's involvement in biodiversity-related action, especially the youth and poorer communities;
- engage in actions leading to protection and restoration of ecosystems threatened by urban activities;
- contribute to processes and partnerships that improve urban environmental management practice.

Urban Conservation has as its flagship project Cape Flats Nature that was started in July 2002. This partnership attempts to build good practice in the sustainable management of fragmented natural habitats in the City of Cape Town's Biodiversity Network in a people-centred way that develops local leadership for conservation action and benefits the surrounding communities. Communities that particularly benefit from this programme are townships where incomes are low and living conditions poor. Cape Flats Nature catalyses on-the-ground conservation management that involves the surrounding communities in preserving the area's natural heritage for future generations. The programme also catalyses access to outdoor classrooms for curriculum-based environmental education and awareness-raising on the doorstep of learners from poor communities. Cape Flats Nature's home is the Edith Stephens Wetland Park (ESWP) on the Cape Flats, a 40 ha piece of land jointly owned by SANBI and the City of Cape Town. Also home to Working for Wetlands (Western Cape) and the Western Cape Primary Science Programme, the ESWP and its associated organizations provide services to surrounding communities, from job creation and youth development to support and training of educators. The ESWP is one of four pilot sites of Cape Flats Nature, a partnership between the City of Cape Town, SANBI, the Table Mountain Fund (WWF-SA) and BotSoc under the banner of C.A.P.E.

The Working for Wetlands, a R65 million per annum programme, was transferred to SANBI in January 2003. The programme focuses on the rehabilitation of wetland areas in various parts of South Africa, working closely with DEAT, the Department of Water Affairs and Forestry (DWAF) and the Department of Agriculture (DoA). The programme recently received a R1.6 million grant from DEAT for the completion of a national wetland inventory for South Africa.

The Greening of the Nation project, managed by SANBI, is a new R75 million programme that has been rolled out in various provinces of South Africa, for community and school greening projects. Activities within this project include the greening of towns (road islands and entrances), schools, crèches, day-care centres, community parks, cemeteries, police stations, cultural villages, as well as the development of community nurseries. Many projects include the development of indigenous gardens as well as vegetable gardens. The programme works in close association with Food & Trees for Africa (FTFA), the first national non-government, non-profit, greening organization in South Africa, established in 1990. FTFA works in response to community requests and through consultation with community leaders. In order to raise funding and spread awareness of the many benefits of greening activities, a proactive media campaign is maintained. As part of FTFA's national tree planting programme, it receives applications for trees from underserved communities across South Africa and attempts to provide as many trees as possible through the help of sponsors. Over 2.2 million trees have been distributed in this way to schools, clinics, old age homes, hospices, police stations, streets and parks.

Conclusion

While plants and plant conservation continue to play a central role in the work of SANBI's national botanical gardens and herbaria, the need to broaden the messages conveyed to visitors and members of the public remains an ongoing challenge. The transition from NBI to SANBI with its broader mandate around biodiversity is a process that was started in 2004 and which offers many exciting opportunities for the organization and the country as a whole. While the subject matter has been broadened for the organization and new programmes have been developed within the organization to address this broader mandate, the fundamental roles attributed to

South Africa's national botanical gardens, namely scientific research, conservation, display and education, remain the same.

Acknowledgements

The author is grateful to SANBI for enabling him to attend the 3rd Global Botanic Gardens Congress in Wuhan, China, in April 2007. Emsie du Plessis (SANBI Publications) is thanked for editing an earlier version of this manuscript.

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