



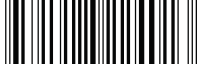
SANBI Herbaria:

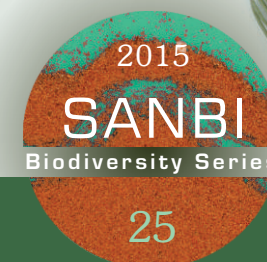
**a decade of foundational
botanical excellence and
collections management
(2004–2014)**

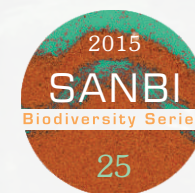
M.S. Mothogoane, R.R. Klopper,
C.N. Cupido, E. Josias, M.A. Mothapo,
A.M. Ngwenya, N. Phaliso,
J.A. Ready, M.S. Serumula,
Y. Singh & E. van Wyk



SANBI 
Biodiversity for Life
South African National Biodiversity Institute

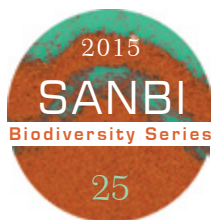
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SANBI Biodiversity Series 25

SANBI Herbaria: a decade of foundational botanical excellence and collections management (2004–2014)

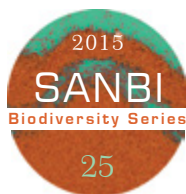
by

M.S. Mothogoane, R.R. Klopper, C.N. Cupido, E. Josias,
M.A. Mothapo, A.M. Ngwenya, N. Phaliso, J.A. Ready,
M.S. Serumula, Y. Singh & E. van Wyk



South African National Biodiversity Institute

Pretoria
2015



SANBI Biodiversity Series 25

The South African National Biodiversity Institute (SANBI) was established on 1 September 2004 through the signing into force of the National Environmental Management: Biodiversity Act (NEMBA) No. 10 of 2004 by President Thabo Mbeki. The Act expands the mandate of the former National Botanical Institute to include responsibilities relating to the full diversity of South Africa's fauna and flora, and builds on the internationally respected programmes in conservation, research, education and visitor services developed by the National Botanical Institute and its predecessors over the past century.

The vision of SANBI: Biodiversity richness for all South Africans.

SANBI's mission is to champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all people.

SANBI Biodiversity Series publishes occasional reports on projects, technologies, workshops, symposia and other activities initiated by or executed in partnership with SANBI.

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FOREWORD

An assessment of natural science collections in South Africa was commissioned by the National Research Foundation (NRF) in 2010. The report highlighted that in general, the value of the collections as critical national and international research infrastructure for a range of disciplines was not well understood by decision-makers and even by the scientists responsible for caring for and researching them. The need to promote the value of natural science collections, and to have a strategic approach to their expansion, use and application, have become increasingly important to ensure that the resources required to sustain them can be justified against increasing social and economic pressures and changes in research trends. Achieving this requires reflection on the past to understand how the collections were established and how they have been used, a critical assessment of the current situation and planning for the future, and lots of changes.



The NRF report identified the three SANBI Herbaria as holding the largest collections of preserved plant specimens in South Africa, which places a large responsibility on our shoulders. Not only is this booklet, *SANBI Herbaria: a decade of foundational botanical excellence and collections management (2004–2014)*, aimed at promoting the collections as irreplaceable and valuable research infrastructure, but it also celebrates achievements over the past ten years, recognising the historical aspects of the collections, and glimpsing into the future. The past ten years have been a time of major change in SANBI and the herbaria, and this has brought about many improvements. The positive attitude amongst staff towards the changes is a good indication that we will continue to improve until we reach perfection!

Dr Michelle Hamer

Acting Chief Director: Biosystematics Research and Biodiversity Collections Division



S.P.Bester 11067

Chapter 1

ABOUT US

Staff members working in the SANBI Herbaria are authorities on research on the indigenous flora of southern Africa. They co-ordinate and promote plant taxonomy, while maintaining and preserving the plant specimen collections that underpin this work.

Our history

On 1 September 2004 the South African National Biodiversity Institute (SANBI) was established through signing of the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) by then president Thabo Mbeki. SANBI's forerunner, the National Botanical Institute (NBI) was an autonomous, statutory organisation formed in 1989 by the amalgamation of the National Botanic Gardens and Botanical Research Institute (BRI). Both these organisations were founded early in the twentieth century to conserve and study the exceptionally rich southern African flora and were world renowned for their expertise in plants.



Where we are

The SANBI collection consists of over 2 million specimens, which are housed in three facilities or herbaria. Our scientists, technicians and support staff are spread across these three centres:

- The **National Herbarium (PRE)** in the Pretoria National Botanical Garden was founded in 1903 by Dr Joseph Burtt Davy. This is the largest herbarium in Africa and the second largest in the southern hemisphere.
- The **Compton Herbarium (NBG)** in the Kirstenbosch National Botanical Garden was founded in 1937 by Prof. Robert Harold Compton. This is the second largest herbarium in southern Africa.
- The **KwaZulu-Natal Herbarium (NH)** in the Durban Botanic Gardens was founded in 1882 by Dr John Medley Wood. The herbarium building and Medley Wood House have National Monument status.

What we do

Staff members working at the SANBI Herbaria engage in various activities that relate to collections maintenance, research, plant identifications and botanical information services. The extensive collection of preserved plant specimens housed in the SANBI Herbaria represents the $\pm 24\,000$ plant species found in southern Africa. These specimens have been collected over more than 200 years, and thus symbolise a record of change in land use over time.

Our national collection of herbarium specimens are a fundamental source of information for plant taxonomic studies and other related research. The foundational science information that we generate and maintain is made available to other divisions within SANBI, and to conservation authorities, decision-makers, academic and research institutions, the general public and other stakeholders.



National Herbarium (PRE)

Compton Herbarium (NBG)



KwaZulu-Natal Herbarium (NH)



Chapter 2

COLLECTIONS

The SANBI Herbaria house a valuable, well-curated and maintained collection of over 2 million pressed plant specimens that are used as a reference for plant identifications, taxonomic research and other botanical studies.

Importance

The collection of the SANBI Herbaria is available for use by researchers from South Africa and around the world. The collections provide users with essential information related to the flora of South Africa. A very large proportion of botanical information published in Floras, plant-related journal articles and monographs are based on data obtained from herbarium specimens. If all herbarium collections were to be destroyed, the majority of our botanical names would be meaningless. Herbarium specimens also provide us with physical records of plants that are believed to be extinct.



Maintenance

It is essential that these valuable herbarium specimens are maintained and preserved for future generations. In this respect, a number of precautions are taken to protect them from threats and physical destruction. The herbarium buildings are equipped with fire prevention systems. Inside each herbarium, specimens are stored in special wooden or steel cabinets to protect them from hazards such as insects and dust. Collections in the SANBI Herbaria are fumigated annually to protect specimens from insect damage. Ad hoc mini fumigations are done throughout the year in cabinets where insect infestations are noticed. Constant physical curation of the collections ensures that specimens are maintained in a good state and stored as effectively as possible.

Arrangement

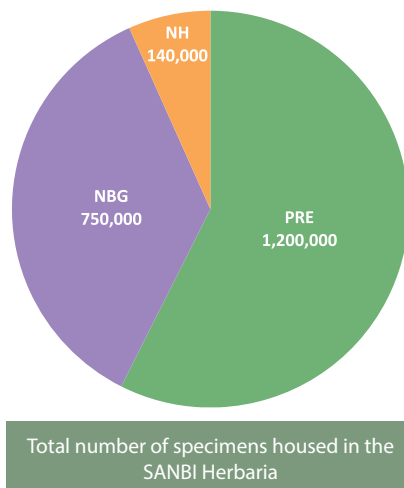
The SANBI Herbaria collections are currently arranged at family level according to the Englerian classification system. Some collections are in the process of being re-arranged to follow the modern Angiosperm Phylogeny Group classification system. Within a family or genus, specimens are ideally arranged systematically, according to the most recent revision of the group. A systematic arrangement is where similar genera or species are placed close together, reflecting their structural or genetic develop-



ment. Ongoing scientific curation ensures that the most up-to-date classification for each group is followed. Specimens of each taxon are further organised into provinces or quarter degree grid squares (indicating distribution). An index or cupboard list is compiled to show the arrangement of each genus to aid users of the collection in finding relevant specimens. The quick guide collection contains a representative specimen of each taxon that is included in the relevant genus, and allows for quick and easy reference, making it easier to perform activities such as identifications.

Growth

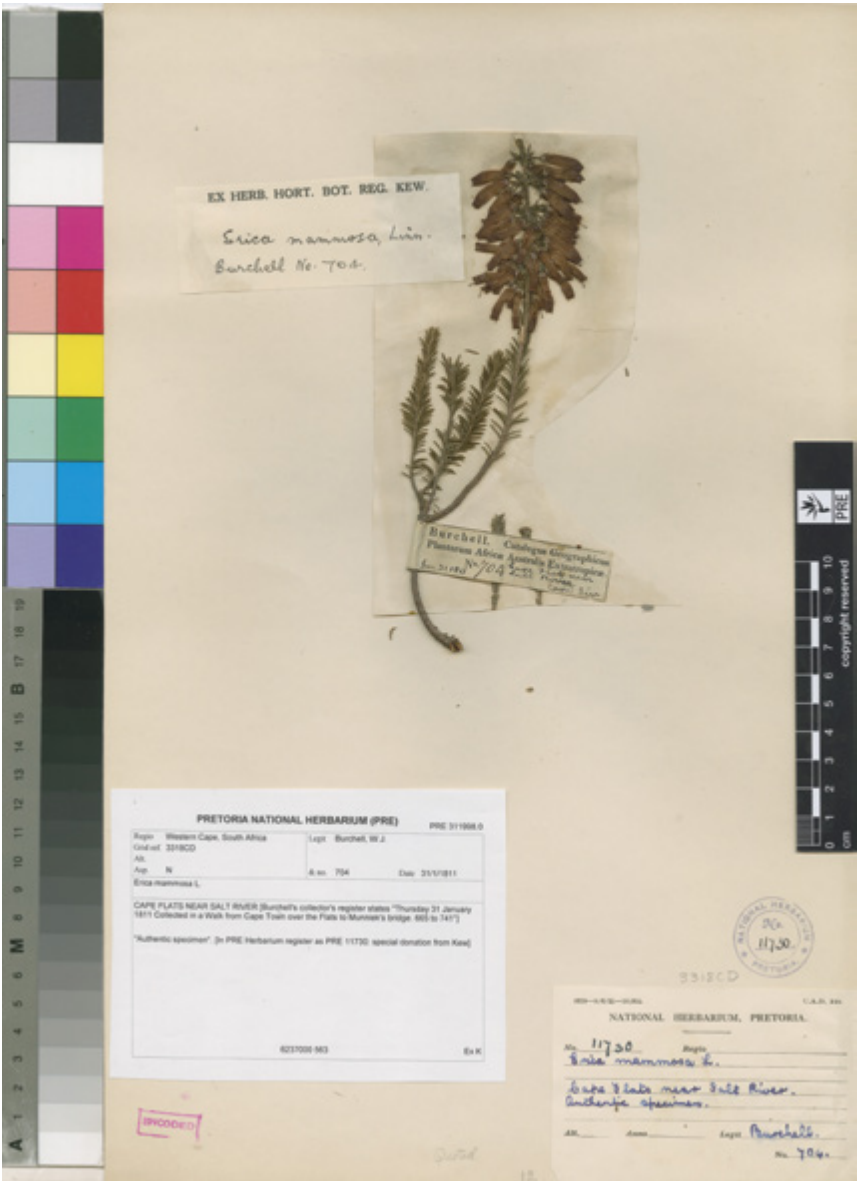
The collections of the SANBI Herbaria are continuously being expanded through the efforts of its staff, associated students, amateur botanists and other researchers and stakeholders. Specimens are added to the collections following collecting fieldtrips and through donations. This ensures that the SANBI Herbaria maintain a representative collection for all species in South Africa. In 2014 the total number of specimens housed in the SANBI Herbaria had grown to almost 2.1 million specimens. It is estimated that the collections have grown over the past ten years as follows: PRE by 35 000 specimens, NBG by 33 900 specimens and NH by 10 500 specimens.



Coverage

National Herbarium (PRE)

The PRE vascular plant collection consists of lycophytes and pteridophytes (ferns), gymnosperms and angiosperms. Most of this collection is housed in four large wings, each named in honour of a previous director. PRE has recently opened a fifth wing to house its gymnosperm and fern collections. Some of the older specimens were collected over 100 years ago, with the oldest specimen being over 200 years old (Burchell W.J. No. 704, dated 31 January 1811, collected on the Cape Flats).



Erica mammosa, collected by W.J. Burchell, 31 January 1811, on the Cape Flats

PRE also houses an extensive collection of lichens and cryptogams. The PRE Cryptogamic collection (liverworts, hornworts and mosses) is the largest collection of cryptogams in Africa ($\pm 70\,000$ specimens). The collection was founded on the T.R. Sim Private Collection, and later incorporated the bryophyte collections of the Transvaal Museum Herbarium, Rhodes University Herbarium, Stellenbosch Herbarium and NBG (specimens previously donated to NBG from the South African Museum's bryophyte collection).

Compton Herbarium (NBG)

The NBG collection mainly covers the winter rainfall region of South Africa. This region harbours around 11 000 of the $\pm 22\,000$ species that are indigenous to South Africa. This collection consists of lycophytes and pteridophytes (ferns), gymnosperms and angiosperms. It was built up from three main collections:

1. The Compton collection was founded in 1937 by Prof. R.H. Compton, who was director of the National Botanical Gardens for the period 1917–1952.
2. The South African Museum (SAM) collection was initiated in 1825 and is the oldest herbarium collection in the southern hemisphere. It is a valuable collection of many specimens from around the world and is kept separate from the main NBG collection. It was transferred to NBG in 1956.
3. The Government Herbarium (STE) collection, founded in 1902, was merged with the NBG collection in 1996.

KwaZulu-Natal Herbarium (NH)

The NH collections are mainly from KwaZulu-Natal and surrounding areas. These form the basis for research on the indigenous plants of the eastern region of South Africa. The collection consists of lycophytes and pteridophytes (ferns), gymnosperms and angiosperms. Specimens collected by Thomas Cooper in the Eastern Cape in 1859 are among the oldest in this collection.





Collected by Thomas Cooper in the Eastern Cape in 1859

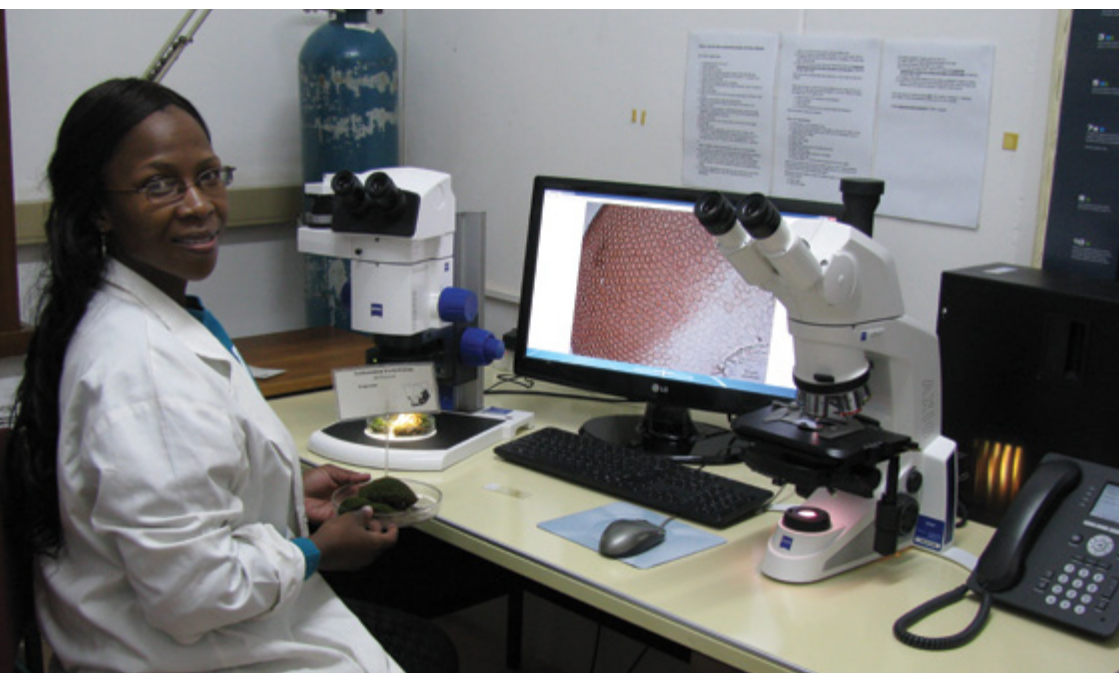
Chapter 3

RESEARCH AND PUBLICATIONS

Research conducted within the SANBI Herbaria has a valuable impact on the accumulation of knowledge on biodiversity. The related research outputs have been published in various formats and are readily accessible to the public.

Foundation

As part of its mandate to assist in achieving the objectives of the NEMBA towards managing and conserving the biodiversity of South Africa, SANBI has been responsible for establishing programmes to maintain the integrity of this biodiversity. For SANBI to effectively perform this function, herbaria have become essential in facilitating research that is necessary to generate the required knowledge.





Systematics research is an integral function of the SANBI Herbaria. Although SANBI is concerned with biodiversity as a whole (which includes plants, animals and invertebrates in various ecosystems), herbaria are where scientists focus on research involving plant taxonomy and diversity. Research conducted in the SANBI Herbaria provides foundational or baseline information that is used by various end users concerned with, amongst others, matters of biodiversity conservation and sustainability. Priority is given to plant groups where little information is available, or those that are in need of urgent conservation efforts, according to resources, such as the Red List of South African plants. This information is used to populate databases and compile checklists as per SANBI's mandate. These outputs are, in turn, used in applied research.

Scope

Although not a restriction to researchers, the geographic locations of the three herbaria and their proximity to various geographic regions of interest, have allowed researchers in each herbarium to focus efforts on specific areas. NBG researchers concentrate on the Greater Cape Floristic Region, which includes the Core Cape Floristic Region and the Succulent Karoo. Researchers at NH in Durban focus on plants found in the eastern region of South Africa, which includes the Maputaland, Pondoland and Drakensburg Centres of Endemism. PRE is situated in Pretoria, and much of the research done at this herbarium is focused on the northern provinces of South Africa.

In many cases research is focused on groups of plants that are revised at a national or regional level. Groups on which research has been conducted at the SANBI Herbaria over the last ten years include: the Aizoaceae, Amaryllidaceae, Apiaceae, Apocynaceae, Asphodelaceae, Asteraceae, Boraginaceae, Campanulaceae, Cyperaceae, Fabaceae, Hyacinthaceae, Hypoxidaceae, Iridaceae, Poaceae, Solanaceae, pteridophytes and bryophytes.

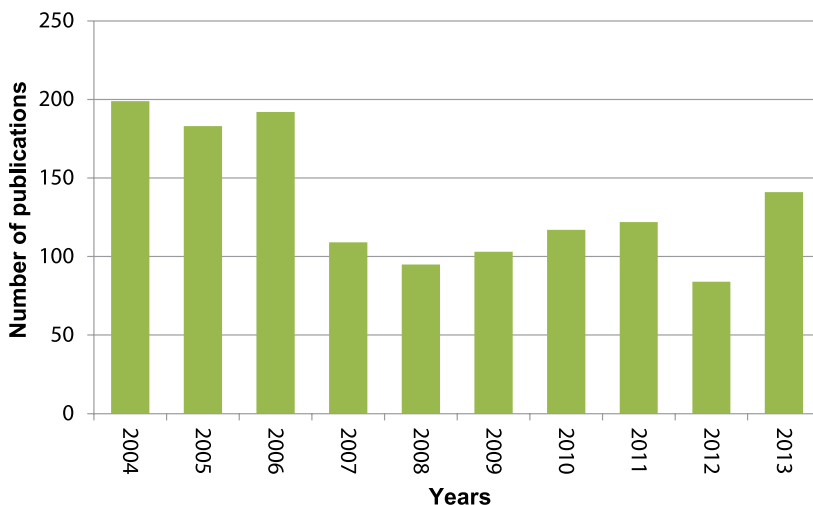
Collaboration

Many collaborative efforts between the three centres housing the SANBI Herbaria have resulted in a large number of research outputs being published over the past decade. Various research groups have been established to allow SANBI scientists to join forces and tackle priority issues involving plant diversity. Many of these projects involve regional or international collaboration with fellow botanists from other leading institutions, e.g. the African Plant Checklist and Database Project, the African Plants Initiative, the Aloes of the World Project, and the e-Flora Project.



Outputs

Research outputs from the SANBI Herbaria are available in various formats and can be obtained online or from bookstores in the National Botanical Gardens and elsewhere. Research publications take the form of papers in scientific journals, popular articles and books or chapters in books. Plant research and taxonomy has accounted for 69% of all publications by SANBI staff between 2004 and 2014.



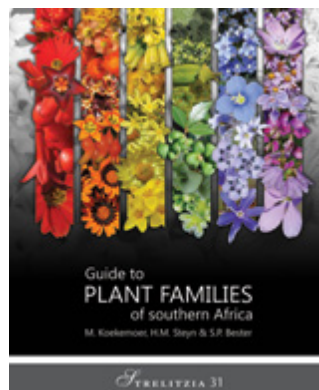
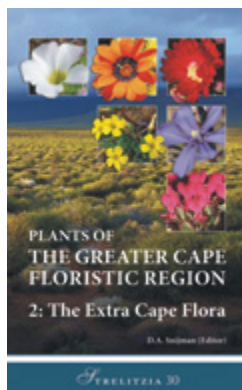
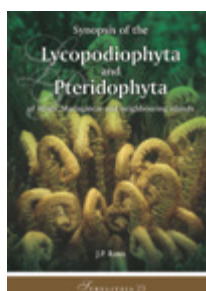
Research outputs by the SANBI Herbaria:
10 years of productivity and excellence.

Examples of significant outputs from the SANBI Herbaria that appeared during the last decade are:

- *Strelitzia* 14: Plants of southern Africa: an annotated checklist.
- SABONET no. 42: *Checklist: flowering plants of sub-saharan Africa.*
- *Strelitzia* 23: Synopsis of the Lycopodiophyta and Pteridophyta of Madagascar and neighbouring islands.
- *Dictionary of Names for Southern African Trees.*
- *Strelitzia* 28: The aloe names book.
- Regional Flora treatments, e.g. *Strelitzia* 29: Plants of the Greater Cape Floristic Re-

gion 1: the Core Cape flora and *Strelitzia* 30: Plants of the Greater Cape Floristic Region 2: the Extra Cape flora.

- *Strelitzia* 31: Guide to plant families of southern Africa.
- Several new genus and over 100 new species descriptions.
- Numerous field guides and monographs.



Chapter 4

PROJECTS

Staff members of the SANBI Herbaria are involved in several large-scale biodiversity-related projects, many of them having a global impact.

African Plants Initiative

Resources for taxonomic research in many African countries are limited. Important specimens (e.g. types) are often included in natural history collections in developed countries and are not readily accessible to researchers in Africa. As one of the founding members of this global project, the SANBI Herbaria played a leading role in the establishment of the African Plants Initiative (API) in 2004. This project aimed to alleviate the constraints of not having access to essential historic material by scanning type specimens and other important collections of African plants. These images are disseminated online where they are accessible to all scientists working on the African flora. To date the SANBI Herbaria have contributed over 35 000 images of scanned specimens, photographic works and botanical artwork to the API repository. The initial successful model for Africa has since been expanded in its geographic scope and the API has been transformed into the Global Plants Initiative (<http://plants.jstor.org>).



Several associated projects were funded through the API Small Grants Initiative. Some of these projects provided further specimen images of plants that were not yet represented by their relevant type specimens in the API collection. Others aimed to add further value to the online resource by accumulating additional descriptive information and/or photographic images for selected groups, such as the Aloes of the World Project (Asphodelaceae) and selected members of the milkweed family (Apocynaceae), daisy family (Asteraceae), crassula family (Crassulaceae), iris family (Iridaceae), mesembs (Aizoaceae: Mesembryanthemoideae), and the ferns and lycophytes.

Aloes of the World



A new database structure: migration to BRAHMS

The National Herbarium (PRE) Computerised Information System (PRECIS) is the largest computerised botanical database in Africa. This system has facilitated plant systematic research and informed environmental decision-making since it was developed in the 1970s. The database contains information on indigenous and naturalised plants in the Flora of Southern Africa region, as well as data associated with the SANBI Herbaria collections. It is one of the most powerful research tools for plant scientists working on the rich flora and vegetation of southern Africa. The PRECIS database was recently migrated to a more modern and globally compatible platform, namely the Botanical Research and Herbarium Management System (BRAHMS). On the BRAHMS platform the database will undoubtedly be increasingly invaluable, providing essential information on the region's rich botanical resources.

Chapter 5

SERVICES PROVIDED BY THE SANBI HERBARIA

Research, curatorial and other activities in the SANBI Herbaria are supported by a contingent of dedicated staff providing services to in-house scientists and researchers from other institutions, as well as to the general public.

Loans

Research programmes regularly require representative specimens that are lodged in other herbaria. As part of ongoing support to scientists, the SANBI Herbaria collaborate with research institutions globally to loan or request herbarium material. This collaboration is crucial to ensure high quality research outputs and needs to be maintained. The SANBI Herbaria also provide high resolution scans where such images are sufficient for the purposes of the study and where the physical specimen is not required. Provision of material is regulated by the loans policy and conditions of the institution.





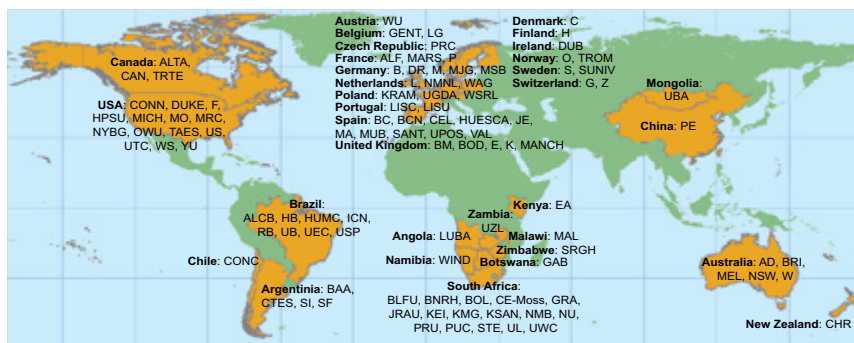
Identifications

The SANBI Herbaria provide a plant identification service to a variety of clients. Clients are encouraged to submit good quality, fertile specimens as this will help staff to accurately identify the material. Good quality specimens are usually incorporated into the collections.

Gifts and exchanges

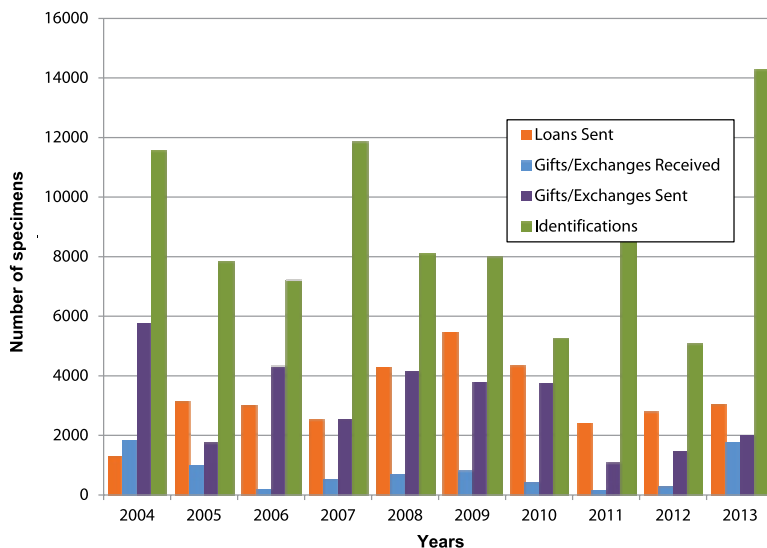
The SANBI Herbaria collaborate with numerous institutions towards herbarium expansion. Material is received from these institutions as part of a gift or exchange programme, whereby duplicate specimens are exchanged between herbaria. This programme also facilitates the enrichment of the SANBI herbarium collections by filling gaps, e.g. we receive specimens from areas where our staff members have not collected, or for taxa that are under-represented in our collections. Gifts and exchanges are often a valuable source of new records.

Collaboration in terms of loans, gifts and/or exchanges is maintained with the following countries and institutions:



Visitors

The SANBI Herbaria annually receive and host hundreds of visitors from other institutions, both local and abroad. In this light we proudly hosted a number of researchers from the International Legume Conference that took place at the University of Johannesburg in 2013, as well as international researchers from, amongst others, Oslo in Norway, Lubango in Angola, Kew in the United Kingdom, Melbourne in Australia,



Services provided by the SANBI Herbaria:
10 years of research support

Gaborone in Botswana, Missouri in the USA, and countless other South African herbaria. We provide a number of activities on appointment whereby university students visit the SANBI Herbaria to receive training on herbarium techniques.

Outreach

The SANBI Herbaria play an important role in exposing young learners and the community at large to environmental management and related activities. This includes a number of educational activities where formal presentations are given. During the previous decade numerous learners, students and the general public were given the opportunity to experience fascinating activities such as the Bussing Programme during Arbor Week and the Herbarium Open Weekend for the public. In line with our role in spreading an awareness of our rich biodiversity, the SANBI Herbaria also annually participated in exhibitions, such as the Sasol Expo and National Science Week. Other outreach and capacity building activities that the SANBI Herbaria were involved in during the last ten years include providing advice and training related to herbarium procedures to the Department of Environmental Affairs' research teams to Marion Island, outreach to the LUBA herbarium in Angola, and providing advice to the newly established herbarium of UNISA. Our staff members further assist the public by promptly resolving thousands of telephonic or e-mail queries annually.



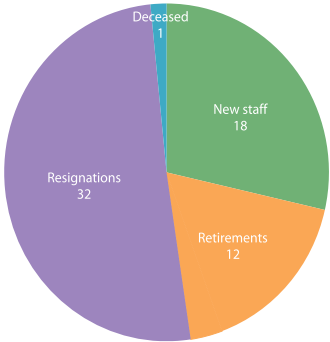
Chapter 6

HUMAN CAPACITY DEVELOPMENT

Staff profile

The heartbeat of the SANBI Herbaria is its dedicated and professional staff. These people work tirelessly to fulfil the mandate of the herbaria and to ensure a vibrant future for plant systematics in South Africa by training young scientists.

The SANBI Herbaria collectively employ around 50 permanent staff members composed of research and support staff. The staff profile has gradually changed over the last ten years due to a concerted effort to appoint employees from designated groups to reflect a demographically representative staff profile. Due to the size of the herbaria, the largest contingent of herbarium staff is situated in Pretoria, with Cape Town and Durban having fewer staff. The SANBI Herbaria act as a training ground for scientists and collection management staff.



Changes in SANBI Herbaria staff
(2004 to 2014)

The SANBI Herbaria have witnessed the retirement of 12 senior staff members over the past decade, many of whom had been with the herbaria for well over 25 years. These retirements represent a loss of valuable experience and expertise in plant taxonomy. Fortunately, a large proportion of retired staff still regularly visit the herbaria, where they are continuing their research and mentoring of junior staff. This ensures that their knowledge continues to be disseminated and that skills are transferred to the new generation of taxonomists working at the SANBI Herbaria.



Ms Lyn Fish (Smook) retired in February 2011 after 34 years of service at the National Herbarium. During her time, she was a very active and enthusiastic collector, making the biggest contribution by a staff member to the herbarium collection (more than 12 660 accessioned specimens). She is still actively involved in herbarium activities and her name will forever be synonymous with the Poaceae (grass family) in South Africa. Her role as mentor is well respected and she still plays a prominent role in the development of young staff.



Ms Wilhelmina (Mienkie) Welman retired in October 2009 after 39 years of service at the National Herbarium. She originally joined the National Herbarium in 1970 when it was still based at Vredenhuis in Pretoria. She is still actively involved in curation and research activities at the National Herbarium and shares her valuable expertise freely among the younger staff members.



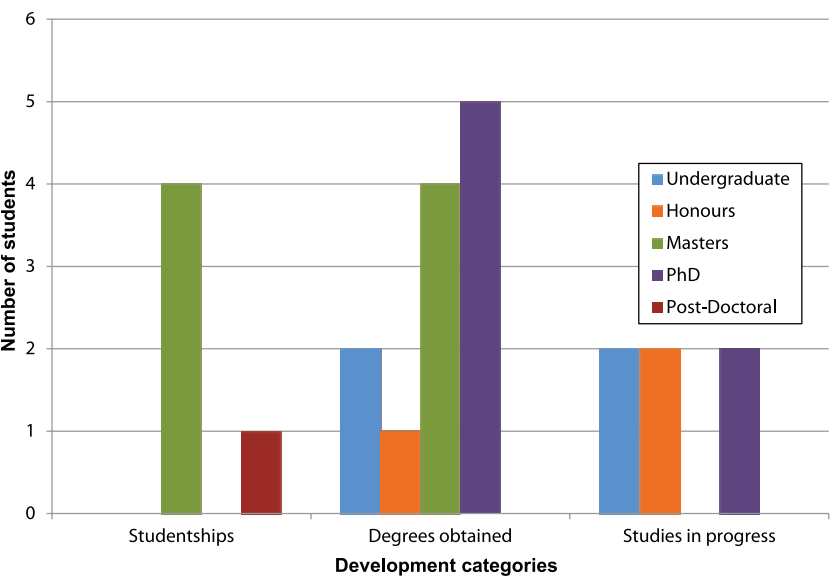
In 2013 Dr Koos (JP) Roux (then curator of the Compton Herbarium) tragically passed away. He has left a legacy of excellent work and research, as well as an immense gap in the field of botany, especially in the research of ferns and lycophytes in Africa, which would be almost impossible to fill.



Dr Dee Paterson-Jones (Snijman) retired in June 2014 after 40 years of impeccable service at the Compton Herbarium. As one of the first SANBI Fellows, she continues her research in the Hypoxidaceae and Amaryllidaceae and plays a vital role in the intellectual capital contribution to the SANBI Herbaria.

Professional development

Staff members of the SANBI Herbaria are encouraged to further their studies and develop their careers optimally. Over the past ten years several staff members have been supported in their studies with bursaries from the institute. Post-graduate studentships were also offered to non-staff who studied under the co-supervision of SANBI Herbaria scientists.



Human Capacity and Studies: 10 years of development



Internship programme

The internship programme continues to expose recent graduates to career possibilities in research and science, to provide training in specific skills and to provide research staff with the opportunity to identify interns for further training and development. The SANBI Herbaria have accommodated a total of 85 interns over the last ten years. NH hosted an additional 29 herbarium students from universities in KwaZulu-Natal, as well as one Groen Sebenza intern.



Seven interns were absorbed into SANBI's employ over the last ten years. Other interns went on to further their post-graduate studies, either with or without financial support from SANBI bursaries and often under the supervision of staff from the SANBI Herbaria. Some interns went overseas seeking greener pastures, whilst others were successfully employed by various institutions and companies, for example the Medical Research Council, UNISA, Department of Fisheries, Department of Water Affairs, Albert Luthuli Hospital, CREW, Robben Island, Department of Economic Affairs, SANParks and CapeNature, to mention a few.

Feedback from interns

A B.Sc. graduate from the University of the Western Cape who completed an internship and is currently enrolled for a B.Sc. Honours Degree under the co-supervision of SANBI Herbaria staff:

'For a recent graduate, working at the herbarium was the greatest breakthrough of my career as a young and upcoming scientist – botanist. The internship allowed me to "test drive" the skills learnt at the university. I was welcomed by kindness and good work ethics, which made the working environment pleasant. Moreover, being in the midst of highly motivated and skilled scientists made it easy and fun to work at the herbarium. I also managed to publish both a popular and scientific paper during my internship! Through my experiences at the herbarium I developed an interest to pursue a career as a taxonomist.'

A B.Sc. graduate, who completed an internship, worked as a contract employee and became permanently employed in 2013:

'I have thoroughly enjoyed my time at the herbarium. Everyone is warm and kind and always at your aid if you need help. The environment was lovely to work in and I have learnt quite a number of skills there that gave me the solid career foundation I have today. This has allowed me to not only explore, but reach my full potential and gave me the confidence to partake in any challenge that I am faced with.'

Chapter 7

WHAT DO OUR STAFF SAY?

Comments from staff

Highlights of working in SANBI Herbaria

Opportunities to study and develop skills

Opportunities to lead teams

Working with colleagues who set high standards of work

The introduction of the career ladder for scientists; this enabled scientists to clearly define their roles

Restructuring of the Division in 2011 so that all scientists are grouped under one umbrella and work together more as colleagues

Opportunity to transfer skills and knowledge to interns by providing training on herbarium techniques

Working in a stimulating academic environment with direct links to the public

Assisting in transforming the herbarium in terms of curatorial systems

Learn about plant families, how to identify plants using keys and making distribution maps

Likes

Friendly working environment
Beautiful campus

Challenge

Due to lack of formal training in botany, I battled with botanical terms, but overcame this by reading glossaries of botanical books

Interesting

Interesting changes are taking place within the herbaria, e.g. moving from PRECIS to BRAHMS

Changing from a botanical institute to a biodiversity institute has brought about some interesting changes

Journey of more than 35 years!



Ms Clare Archer, a scientist at the National Herbarium, recalls her journey of over 35 years at the SANBI Herbaria

I came straight from Natal University (Pietermaritzburg) armed with a B.Sc. (Hons.) in Botanical Systematics in 1979 and knowing not much about the work that I was appointed to do. So it was a big challenge to teach myself (no mentors in those days!) by literature research and by asking questions.

There were also no individual PCs, e-mail or internet at that time (let alone digital cameras and GPSs) so everything took much longer! The time frame allowed for skills development was perhaps more realistic compared with today, since BRI (as it was then) was a small organisation and management had all previously held similar posts in the herbarium and had a deep understanding of the length of time it takes to become truly competent in these skills.

The next challenge was to undertake my part time M.Sc. Security in Pretoria was not such an issue then and I was entrusted with keys to the Reynolds Gate and the Mary Gunn Library, so that I could work after hours (until midnight if I wished) and during weekends on literature research, measuring specimens and particularly operating the SEM. Soon after graduating I was nominated as the first short-term South African Botanical Liaison Officer (SABLO), to work in the herbarium at the Royal Botanical Gardens, Kew (United Kingdom) for six months. This was a great honour and an opportunity to meet many international botanists while carrying out botanical liaison work, representing NBI at Chelsea Flower Show and even attending SA Embassy cocktail parties (well, only one!) while being able to work on my own research, consulting Kew's vast collections. I arrived at Kew in winter and left in autumn, and it was truly wonderful to see the gardens blossoming in spring. With my then fiancé, Robert (also a plant taxonomist), we managed a quick trip by ferry and train to the Continent, visiting herbaria in Copenhagen, Stockholm, Uppsala, Berlin and Paris. What an experience!

Working at BRI/NBI/SANBI has also allowed me to explore the length and breadth of my own country while engaged in observing plants in the field and preparing good plant specimens for the herbarium. Each trip was challenging in that it needed to be properly planned but flexible, in order to take advantage of information gained from speaking to local inhabitants. Most of these were camping trips – on several occasions we pressed plants in a howling gale, then still had to erect tents and cook food!

Changes since 2004? SANBI itself has changed, since it is no longer plant taxonomy orientated, but I continue with the same work that I was appointed to do and still enjoy, including passing on knowledge to young staff to ensure continuity when I retire and responding to requests for specimen information from botanists worldwide.

Chapter 8

SHAPING THE FUTURE OF BIOSYSTEMATICS

This booklet is a pause for reflection on the role of the SANBI Herbaria, including a snapshot of advancements over the past ten years and of how we use them beyond today.

Looking back

The decade began with a change in the concept of the institute from 'botanical' to 'biodiversity'. Over the last ten years there has been much change in the heart of SANBI, with growth in many areas reflecting the expanded mandate to include all biodiversity. In the case of the Biosystematics Research and Biodiversity Collections Division, under which the herbaria fall, this growth involved establishing animal systematics, and considering natural science collections in South Africa beyond our own institute and for other aspects of biodiversity. Optimism prevailed and there were plenty of firsts: a Biosystematics Research Strategy for South Africa, leadership for collections management, the three geographically separate herbaria seen as one collection and the establishment of National Checklist and e-Flora projects. All the changes shaped the way we conduct business. With limited capacity and funds, we directed our response to setting strategic priorities for the immediate future.

Looking ahead

We are in an era of strategic management and massive technological advancements for managing and disseminating biodiversity information and this creates new opportunities for herbaria. While there is no single recipe for these processes, we have managed to use them effectively in three areas of our work:

- **Research:** In the past, research was driven by curiosity, rather than being directed towards gaps or needs. SANBI has developed a Biosystematics Research Strategy that addresses the needs of end users, thus improving the relevance and impact of research products delivered by taxonomists. This strategy is the first comprehensive leading document produced for the major biota of South Africa, covering the algae, animals, bacteria and archaea, fungi and plants. Intended to guide South



African institutions involved in taxonomic research, the strategy encourages research in plant groups that were identified in a priority-setting exercise. The vision for the plant component of the strategy is: 'to document and provide predictive classifications for South African plant species, enabling users to identify and access knowledge about them, so that all can understand, conserve and benefit from biodiversity'.

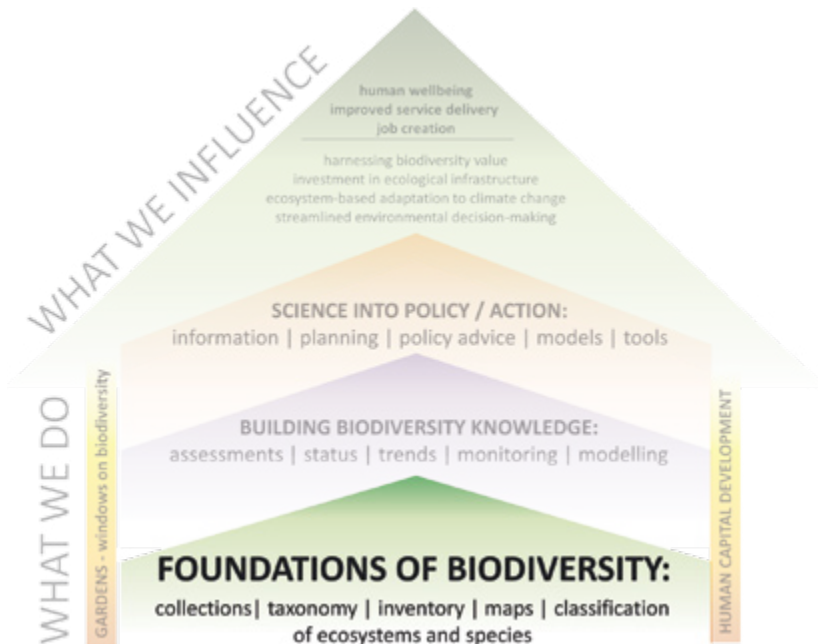
- **Collections management:** The importance of herbarium specimen collections as a source of information is highlighted in this publication. There has been consistent growth in the number of specimens represented in the SANBI Herbaria. A review of the specimen-collecting profile shows recognisable gaps in our holdings. Therefore, future collecting will focus on priorities, such as species with less than five specimens in our collection and under-collected areas with high plant species diversity. With expansion comes the demand for storage space for specimens. Modern space saving storage as well as environmentally friendly and safe pest control methods are being investigated. A significant extension to our specimen collection is the addition of DNA samples and silica-dried plant material for molecular research to enhance our range of collections.

In the past ten years emphasis has been placed on making herbarium specimen information available to as wide an audience as possible. This was done through working towards capturing information from all specimens on SANBI's plant database and developing products from this database to support checklists and regional Floras. In more recent years, emphasis was also placed on accuracy and

quality of the data, and on making it accessible in electronic format and ultimately online. In the future, we will be a near-complete source for physical specimens, digitised information and DNA samples for the flora of southern Africa.

- **Services:** While herbarium service outputs fluctuated over the past decade, the importance of the services has been highlighted and focused on value to audiences and products informing wider biodiversity aims. That is where the SANBI Herbaria prove to be a great fit – providing a powerful dataset, based on accurate plant identifications, for activities such as species and ecosystem conservation assessments, land-use planning, and integrated biodiversity research.

Many of these changes have steered us towards being more end-user orientated – providing foundational or baseline information that is used by various end users in biodiversity. SANBI's work can be conceptualised as a value chain in which our science forms the base of a continuum. The chain starts with very basic information on biodiversity (our work); it then builds on these foundations with monitoring, assessment and tools for planning; and finally gets to a point where the latter are used to provide focused ad-



The role of Biosystematics and Collections as a foundation of biodiversity as illustrated in SANBI's value chain

vice to decision-makers. The role of biosystematics and collections in this value chain is well defined. However, it needs to be further built on and shaped, so as to continue to provide an excellent resource that contributes to the conservation and sustainable use of biodiversity into the future.

Looking beyond business – human capacity development

With limited resources and reduced staff numbers, more attention is given to staff retention and development. Staff members are encouraged to develop their careers optimally in line with clearly defined priorities in biosystematics research and collections management. Training and capacity building initiatives, such as internship programmes, provide opportunities for skills development that will cater for future staff needs at SANBI, but importantly also ultimately for the wider biodiversity job market.

A final word

While maintaining the rich tradition in documenting and researching plant biodiversity over the last ten years, we have embraced the challenge towards transforming the SANBI Herbaria into modern facilities, reflecting global classifications, as well as South Africa's socio-political and scientific demands.

We feel that it is time to also say thank you to all who have supported the SANBI Herbaria in the journey throughout the past ten years, and to acknowledge the contributions of countless individuals who have contributed towards building the collections and the knowledge base of the South African flora.







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