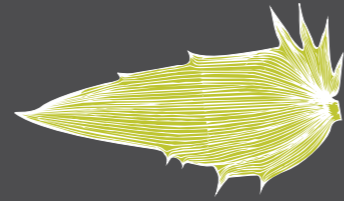


WOODIANA

N°005
2017



Cultivating People and Plants

Biodiversity
Education
People & Plants
Heritage
Research
Horticulture
Culture

A Publication of the Durban Botanic Gardens Trust



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A CHAIRMAN'S VIEW

Ivor Daniel – Chairman: Durban Botanic Gardens Trust

Welcome to Edition No 005 of Woodiana. Looking back over 40 years of practice as a Durban architect, this edition resonates strongly with me. This is because it touches on ecological planning and design themes relevant to integrated urban planning. The current eThekweni Inner City Local Area Plan shares planning principles with the Garden's Environmental Education Programme and the Municipality's Integrated Development Plan; all of which have adopted the United Nations Global Goals for Sustainable Development, providing an encouraging conceptual framework for collaboration and alignment.

Another joint endeavour between the Gardens and the City concerns an idea with which the Trust has been involved for many years – to find an alternative to the precious, potable mains supplies that are used to water the Garden's plants. Please read this article, which also provides a brief introduction to the important topic of sustainable urban drainage.

Two personal stories caught my attention – those of Hazra Moosa and Ryan Ramsamy, who have invested personally in the Gardens in different ways.

Their accounts gave me pause to reflect on my 40 years as an architect in Durban, and to look ahead to our projected urban future which may re-fashion us as almost entirely urbanised societies. Under this scenario, places such as Botanic Gardens may keep environmentalism alive under conditions in which access to wilder settings is no longer possible. These places will allow us to re-imagine Nature in cities, as Ryan has done with his camera and Hazra with her activism. And while small enclaves like Botanic Gardens may assist in inspiring us to restore and even retro-fit nature into urban environments, we must not forget their cultural significance – Botanic Gardens are often the last repositories of heritage plants.

The Trust was also proud to host the official opening of the Butterfly Habitat Garden. While this new space will provide inspiration to indigenous gardeners and lepidopterists alike, its true message lies perhaps in a vivid depiction of interconnectedness – without their host and nectar plants there would be few butterflies; while butterflies are crucial pollinators of many plants.

Most pleasingly, the Trust's commitment to the maintenance of plant collections has borne fruit. The Garden's Cycad collection was recently the subject of an extensive review (see Woodiana No 002, 2013) and, as a result, is now the focus of a conservation project initiated by researchers from the UKZN School of Life Sciences. The documentation of plant collections is fundamental to the identity of Botanic Gardens. This point is reiterated in the article on the Garden's ArcGIS project, which underpins the Garden's documentation efforts, and is another example of collaboration between the Gardens and the Municipality.

Finally, the Gardens are seeking new sponsors for our Music at the Lake series. Perhaps more than anything else, Music at the Lake has pushed the Gardens into new territory, helping us to make concrete our aspiration to re-define our role and to expand our outreach. The social cohesion that music invites is a vital ingredient of the common ground upon which we must stand in uncertain times. Music is here to stay. If you haven't attended a concert yet, the time is now.

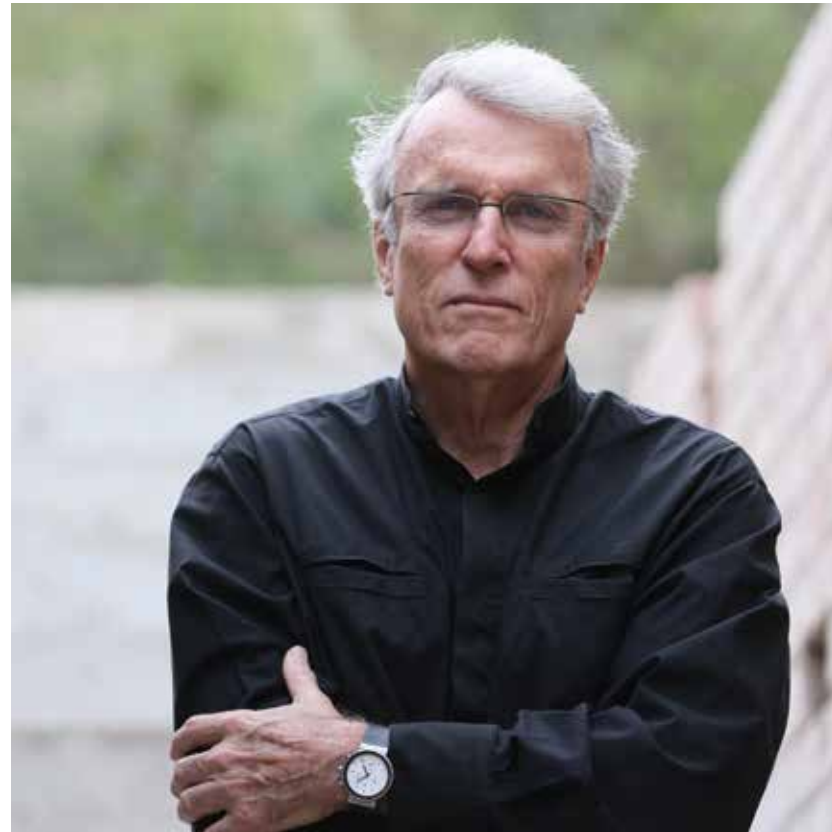
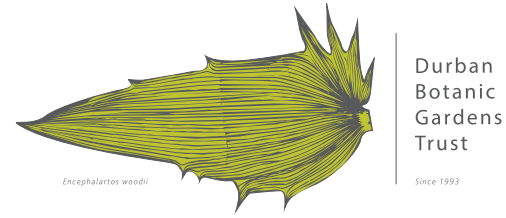


Image by Clinton Friedman

A MESSAGE FROM THE CURATOR

Martin Clement – Curator: Durban Botanic Gardens

We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature.

- Pope Francis Laudato Si' 139

Gardens are a metaphor for life, not only indicative of the challenges we face as society but hinting at our vital connection with the natural world within the mostly urban spaces in which we live and define ourselves. The Sustainable Development Goals (SDGs) ratified at the United Nations on September 25, 2015 are important for cities globally if we are to promote resilient societies mindful of the ecological and social systems that support life at all levels. At a local level we are implementing the SDGs into our schools programme at the Durban Botanic Gardens, realising that their social and ecological interrelatedness is relevant to gardens-based learning and our own urban context. As a city Garden in a water-scarce country we need to set an example of wise water use, and a new water conservation project is unfolding that will involve the harvesting and ecological cleaning of water from the local stormwater system adjacent to the Gardens to provide irrigation water. The Durban Botanic Gardens remains a refuge for nature and culture that is continually refreshing itself. From our new indigenous butterfly habitat garden with its playful eco-literacy aspirations to the ever-popular Music at the Lake, the life of the Gardens continues to uphold why gardens and gardening offer inspiration for the future of urban spaces. Diversity is more than just strength but rather fundamentally about who we are as human beings: eager to make relationships between ourselves and the bio-diverse world more meaningful and real.



Image by Clinton Friedman

Taking Flight – the Butterfly Habitat Garden comes of age



Image by Clinton Friedman

Covered in purple-flowering Ipomoea (*Ipomoea cairica*) and the twining Green-stem (*Adenia gummifera*), the steel girders of the dome filter the sunlight into walkways hung with information boards on Durban's butterflies, their lifecycles and biology. Beyond the dome, a garden designed to attract butterflies beckons - open *Justicia* and *Delosperma*-fringed lawns leading to pathways which wind through *Asystasia*, *Plumbago*, *Isoglossa*, *Hypoestes* and the splendid ruby-coloured *Hibiscus praeteritus*, among many others. A collection of approximately 157 plant species, splendidly landscaped to reveal the relations between Durban's butterflies - 54 of which have been recorded here - and the plants that they pollinate, feed and breed on.

After being given a period to settle in, the Garden was officially opened on April 4th on a sunny morning, the sky alive with butterflies over the new umPhafa section of the Gardens in which the dome is housed. The proceedings were initiated by Sibusiso Mkhwanazi, Senior Manager: Parks, Leisure & Cemeteries Department, who thanked the Durban Botanic Gardens Trust for the

R454 416.00 spent on the Garden to date, noting its value as a living, outdoor classroom to the Garden's Schools Education Programme, and its message to those who "have not yet taken this subject into their hearts." Gardens Curator Martin Clement thanked the Butterfly Habitat Gardens designer, Zoologist and butterfly specialist Dr. Americo Bonkewitz, his assistant Kay Shabalala, and the Durban Botanic Gardens team of Janet Gates and Butterfly Habitat Garden staff Sindisiwe Khanyi and Peter Cronje. Durban Botanic Gardens Trust Chairman Ivor Daniel acknowledged the support of Goodrickes Attorneys, whose association with the Gardens dates back to the year 1849, in which both institutions were founded and J.R. Goodricke was Durban's Mayor. In the early 1950s Goodricke served as President of the Natal Agricultural and Horticultural Society under whose auspices the Gardens were managed. Today, this association continues through the Company's sponsorship of the Butterfly Garden signage, while one of the firm's partners, Lizl Coppejans, serves on the Durban Botanic Gardens Trust.



Image by Clinton Friedman

A walkway in the domed structure of the Butterfly Habitat Garden, with signage sponsored by Goodrickes Attorneys, whose association with the Gardens dates back to its founding in 1849. The dome is now the home of the Durban branch of the Lepidopterists' Society of Africa and its concrete floored interior may be used for lectures, butterfly gardening courses and school group activities.



Image by Andrew Carter

Aiden Fayle - Partner, Attorney and Notary Public; Thobani Manqele - Partner and Attorney & Robin Topping - Associate and Attorney at Goodrickes Attorneys attended the opening.

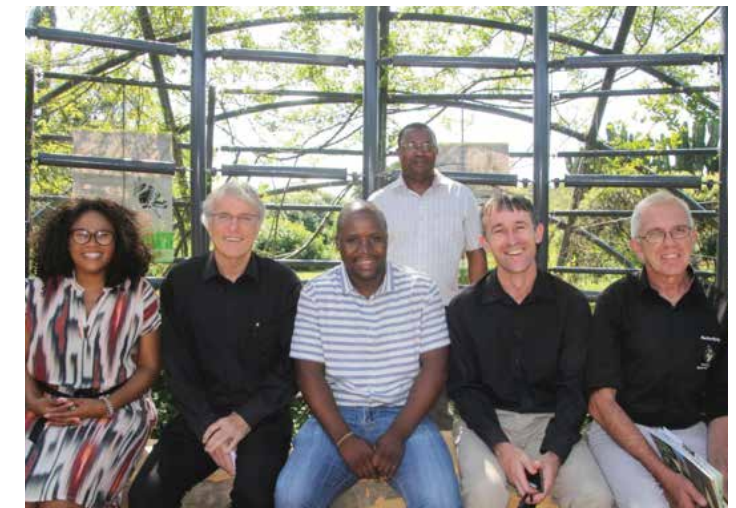


Image by Andrew Carter

Enjoying the event were, at back Sibusiso Mkhwanazi (Senior Manager: Parks, Leisure & Cemeteries Department); at front - Amanda Bani (IDP Stakeholder Manager, eThekweni Municipality), Ivor Daniel (Chairman, Durban Botanic Gardens Trust), Themba Ntuli (Deputy Chair, Community Services Committee), Martin Clement (Curator, Durban Botanic Gardens) & Garden designer Zoologist Dr. Americo Bonkewitz.

Before entering the Butterfly Habitat Garden for refreshments Councillor Themba Ntuli, Deputy Chair of the Community Services Committee thanked the parties who had worked together to bring the project to fruition, and the Trust for its assistance with education and staffing, and for its many projects.

Entering the Garden, guests were able to enjoy the dome structure, its steel girders now a trellis for butterfly attracting creepers; and beneath which, along a walkway, are beautiful information boards identifying eThekweni’s common butterflies, showing the Gardens’ layout and offering an overview of butterfly biology, all in both English and isiZulu. Inside the dome are also two unique wooden benches carved by Durban sculptor Keith Roderick from the Chinese Soap Berry (*Sapindus mukorossi*), which was felled as a safety measure after showing signs of advanced rotting, having been a resident of the Gardens for approximately 90 years.



Image by Clinton Friedman

One of the two benches carved from Sapindus mukorossi, the Chinese Soap Berry. A native of India and Japan, this specimen presided over the path between the John Zikhali Road entrance and the Education Centre where it was probably planted during the 1930s during the Curatorship of Ernest Thorp, although the date is not certain. Recently, it began to rot and had to be felled for safety reasons.

Outside the dome, the instructive nature of the Garden is evident – butterflies are in abundance, birds flit among the branches; and the Garden recently attracted the attentions of the Durban Natural Science Museum’s Curator of Entomology, Dr Kirstin Williams, who with assistant Natasha Govender surveyed its insect population.

The Garden’s layout greatly enhances its educational impact. Partitioned into modules, each zone is planted to meet the needs of particular butterfly groups. This enables visitors, assisted by a poster, to observe the different groups of butterflies in the Durban area and their specific host- and nectar-plant requirements.

According to DBG Curator Martin Clement, this combination of layout, signage, diversity and interpretation extends the concept of wildlife gardening to a new level. The Garden offers an ecologically instructive presentation that will inform indigenous gardeners and landscapers, butterfly lovers and natural historians. Already, butterfly gardening training courses are on offer at the Gardens with Dr. Americo Bonkewitz, and the Garden has attracted significant interest from the public. Its atmosphere is greatly enhanced by the fact that the butterflies are not caged, and can be observed in a setting that feels very natural. These factors cement the Garden’s potential as a template for indigenous landscaping and wildlife gardening in eThekweni. It is hoped that an on-site facility will one day allow visitors to purchase plants encountered during their visits.

DURBAN’S BUTTERFLY HABITAT GARDEN NEEDS VOLUNTEERS!

As the host- and nectar-plants in the Butterfly Habitat Garden grow and mature, it is expected that large numbers of butterflies and moths will be attracted to the area, and it will be a valuable exercise to record the changes in butterfly numbers and diversity as they occur. Volunteers, and specifically members of the Lepidopterists’ Society are needed to conduct this monitoring, and to take photographs of the butterflies and other insects recorded, ideally twice weekly.

This opportunity to contribute to Citizen Science would suit retired people or school groups. You do not have to be an expert on butterflies, moths or photography - enthusiasm and a willingness to learn, and donate your time, are all you need. As well as helping with an exciting project, you will learn a great deal about butterfly gardening in Durban.

Contact: Janet Gates _ 031 322 4010 _ jane.gates@durban.gov.za

SUPPORT THE DURBAN BUTTERFLY HABITAT GARDEN

If you would like to contribute towards ongoing maintenance and development of this project, please get in touch with us.

Contact: Kerry Phillips _ 031 309 9240 _ marketing@dbgt.org.za

Sustainable Development Goals as a teaching model

Now operating at capacity, the Durban Botanic Gardens Education Programme is reaching approximately 500 eThekweni learners monthly. While the Programme has the intellectual and networking capacity to expand, its small staff complement and limited facilities prevent this. The Programme needs support, as the Gardens strive to address the need for environmental education among eThekweni’s school children.

In pursuit of this aim, the Programme recently adopted the World’s Largest Lesson, a collaborative education project made freely available in support of the United Nations Global Goals for Sustainable Development.



Image by Clinton Friedman

Schoolchildren immersed in the environment with the Durban Botanic Gardens Education Programme which focuses on Grade 5 & 6 learners, offering curriculum-linked instruction in an unparalleled outdoor classroom.



Image by Clinton Friedman

Durban Botanic Gardens Education Officer Jody Fuchs introducing learners from Hillgrove Primary School to the World’s Largest Lesson at the Durban Botanic Gardens.

These materials provide an accessible conceptual framework and much-needed resource for children old enough to begin thinking about the problems faced by the planet and its people. Inspired by the materials, and noting the incorporation of their seventeen sustainable development goals into the eThekweni Municipality’s IDP, the Gardens recently hosted a workshop for eThekweni Primary School teachers to highlight the value of this resource for cultivating environmental awareness. Jody Fuchs, the Gardens Education Officer, believes that this intervention and the hoped-for uptake of the materials will lead to positive gains – both socially and environmentally – in schools and the communities they service, as teachers begin to work with and pass on this information.



Image by Jody Fuchs

Attendees at a recent DBG-hosted workshop on the value of the United Nations Sustainable Development Goals and their associated teaching materials as a resource for eThekweni Primary School teachers. The teachers were addressed by, among others, an Educational Psychologist, Education Officers from Durban Solid Waste and Umgeni Water, local school teachers, the Botanical Society of South Africa, BirdLife South Africa and the Department of Economic Development, Tourism and Environmental Affairs (EDTEA).

Additionally, the UN materials have been incorporated, where relevant, into guided tours offered by the Gardens' volunteer guides as part of the Environmental Education Programme. More specifically, goal 13, which deals with Climate Change, has been included in the WESSA climate change game featured in the previous edition of Woodiana. The game is currently being run on behalf of the Gardens by Hazra Moosa, a UNISA law student passionate about biology and the environment, and for whom the Gardens are a needed outlet for living her values.

Inspired by visits to the Durban Natural Science Museum as a child, Hazra became a Museum volunteer after leaving school, and later offered her services to the Gardens too when she began studying at the beginning of 2017. Inducted into the volunteer guides programme, she was introduced to the Climate Change Game which she now runs three days a week. Hazra has added much to the game, introducing topical, everyday examples and current issues into her discussions with Grade 5 and 6 learners. Passionately outspoken, Hazra contends that "...we play the game because Climate Change is happening right now – the children love the game, but we are teaching them about the harsh realities of the world." Hazra's dedication to the game is rooted in this activism, and the fact that the game is always fresh, loved by the learners because of its competitive, interactive and movement-based format.

Questioned about how she manages her busy schedule, she is adamant that her "love of the game", the Gardens, and the children brings balance to her life as a student, and that she is able to study in the evenings. Once conflicted about choosing to study Law in preference to Biology, she now says – "Volunteering has taught me that studying is not the only route, and that learning this way is the best way for me...the Gardens has allowed me to learn and share, and the Climate Change Game has brought these things together."



Image by Kerry Phillips



Image by Clinton Friedman

Hazra Moosa, a passionate climate activist and natural historian, for whom the Gardens Education Programme offers a path to learning more about subjects she loves while sharing her knowledge with others. Hazra was acknowledged as a Pioneer in Public Engagement in the May 2017 edition of Botanic Gardens Conservation International's publication Roots.

A CALL TO VOLUNTEER

AT THE DURBAN BOTANIC GARDENS EDUCATION CENTRE

THE DURBAN BOTANIC GARDENS IS RECRUITING VOLUNTEERS FOR ITS EDUCATION OUTREACH PROGRAMS

WE NEED TO EXPAND OUR VOLUNTEER GROUP TO CATER FOR THE INCREASING DEMAND ON THEIR SERVICES

- do you have that volunteer spirit?
- are you older than 18 years old?
- do you love nature?
- do you have free time?
- can you travel to Durban Botanic Gardens easily?
- are you prepared to work for no salary?

IF YOU ANSWERED YES TO THE ABOVE QUESTIONS THEN THIS PROGRAM MAY BE JUST FOR YOU. FORMS ARE AVAILABLE AT THE VISITORS CENTRE.

CONTACT US DIRECTLY:

JODY FUCHS (Education officer): t_031 322 4025 e_jody.fuchs@durban.gov.za
 THAMI MBHELE (Information officer): t_031 322 4019 e_thambi.mbhele@durban.gov.za



Big Pictures in a Small Space - a Photographer in the Gardens

As have others before him, Ryan Ramsamy discovered the Durban Botanic Gardens to be a big space inside a small one. The more he looked the more he saw. He began spending time in the Gardens as a beginner birder and photographer, after watching *The Big Year* (a comedy about birding, which spoke to his competitive nature and love of the outdoors), falling for birding, and wanting to share photos of his sightings with his Cape Town-based fellow birder and fiancé. Interestingly, Ryan's late grandfather worked in the Gardens in the 1950s, and Ryan lives nearby, so the Gardens were a natural place to start, and he became a weekly visitor. His growing skill as a photographer, instead of propelling him further afield, sparked a patient attention to the close-at-hand. He began to note the behaviour of his subjects, learning where and when they were best photographed; and where to locate himself, depending on the time, the light, the movements of birds. As he learned to look, he saw fewer reasons to look elsewhere.

Coupled with a growing technical skill, his observations and attention to detail led to award-winning pictures, published in *Country Life* and a number of online fora. While friends enquired about which Game Reserves he'd been visiting, Ryan continued to return to the Gardens.

Following introductions from the Gardens' Education Officer, Jody Fuchs, a fellow Masters student at DUT, Ryan now works closely with Trust and Gardens staff, sharing photographs, bird sightings and his own infectious presence. Many of the Gardens staff now know Ryan, offering their own observations and friendship. His Gardens community also includes other regular visitors, and other photographers, among whom he has made a number of friends.



Image by Elana Schitz
Precise and passionate – Ryan Ramsamy at work in the Durban Botanic Gardens.



Images by Ryan Ramsamy
Ryan has recently also taken to photographing the Gardens' many Painted Reed Frogs (*Hyperolius marmoratus*).



Image by Ryan Ramsamy
A Thick-billed Weaver wings its way across the Botanic Gardens lake
Image by Ryan Ramsamy
Breeding Malachite Kingfishers, drawn by the Lake's fish, insects and frogs, and seldom found far from water
Image by Ryan Ramsamy
Often present, but seldom seen, the Garden's Black-throated Wattle-eye



Image by Ryan Ramsamy
While many visitors have observed Pink-backed Pelicans alighting on the lake, the photographer's eye can reveal the ordinary moment anew. Pink-backed Pelicans began breeding in the Gardens in 2003, and when active the Lake is one of only two breeding sites for this species in South Africa, highlighting the potential role the Gardens may play in conserving this species, which is classified as 'vulnerable'.

It is not known where Ryan's camera and sharp eye will take him next, but his story is not a new one. For many associated with the Gardens – walkers, artists, parents and plant lovers – identities are cultivated through significant moments (or photographs), ongoing association over the years and the simple practices of observation and attention. The Gardens has a strong place identity for many, and Ryan's story adds another layer to the many ways in which this identity may emerge.

New Developments in Collections Management

A widely accepted definition of Botanic Gardens, according to Botanic Gardens Conservation International (BGCI) is that they are "institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education."

It is this definition which separates Botanic Gardens from public parks – record keeping is a key activity in defining a botanic garden, and distinguishes a merely ornamental collection from one with scientific and educational value. This definition reminds us that living plant collections need to be supported by information management systems. These systems must link identified individual plants to all the information held by the Gardens that pertains to them. At minimum, this information would generally include –

- taxonomic information – family, genus, species and common names
- collection date and origin of plant (country), habitat description, geographical co-ordinates and uses

The scientific and educational value of a collection always rests on this first step.

Obviously, information management systems, or databases, may also contain additional information on plants and/or plant collections that reflect the specific Mission, collections policy and unique identity of each botanic garden.



Image by Clinton Friedman

Record keeping is what separates Botanic Gardens from public parks. These accession books, still housed in the Curator's House in the Durban Botanic Gardens, date back to the late 1800s.

Steps to introduce such a system were first taken in the Durban Botanic Gardens in 1999, when the Gardens were surveyed and mapped at a level of resolution capturing every woody specimen in the Garden. For the first time, it became possible to establish fully what plants were in the Gardens' collection, and the spatial data generated by this exercise included approximately 1 225 trees, 745 palms and 254 cycads. These specimens were ground-truthed in the field by Gardens staff and volunteers to confirm the accuracy of their names and positions, and the majority of them were subsequently labelled.

These data are currently being updated and managed with Geographical Information Systems (GIS) software through a collaboration between the Gardens Special Collections Team and eThekweni Corporate GIS who are assisting the Gardens to incorporate them into the Municipality's current ArcGIS database software and City-wide GIS network.

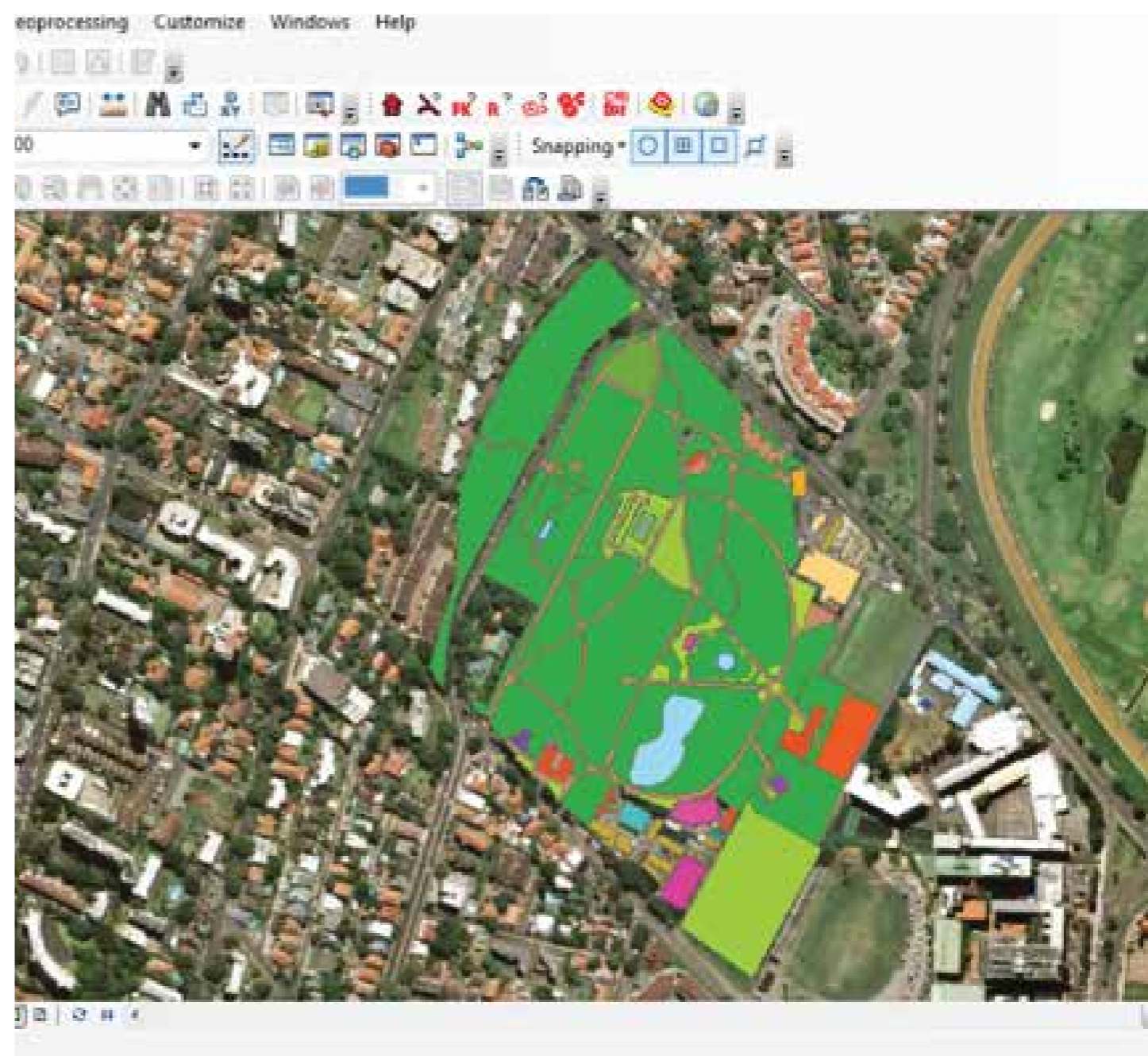


Image supplied by Durban Botanic Gardens

A screen grab of the newly-updated Durban Botanic Gardens ArcGIS project which serves simultaneously as a database collections management tool and spatial locator of the plants in the Garden's collections. The accessions include botanical information on the specimen's taxonomy, common and indigenous names, natural history, distribution and other attributes. The use of survey data and ArcGIS software allows plant positions to be precisely fixed, easily stored, edited and queried to produce powerful interpretive, educational and analytical outputs, including hyperlinks to web-based resources and additional information.

As a result, the Gardens have become the first ArcGIS-mapped open space in the City, creating a platform for further developments such as mapping the new umPhafa site or using emerging technologies like ArcGIS-collector to survey new sites of botanical importance. Additionally, the support of eThekweni Corporate GIS means that the database may be accessed online through the eThekweni Municipality website by the public, students, the international botanic gardens community and academics, among others. The ArcGIS database also allows for hyperlinks to web-based resources and information, potentially allowing the Gardens to remain current with emerging developments in collections management and curation, and innovations in online user-group and public outreach.

The spatial documentation of collections using Geographical Information Systems as described adds a significant layer of value to plant collections management. Once correctly populated, spatial databases can store and retrieve accessions and their associated spatial locations, while also linking them to the data discussed above. In large Gardens, this ability to precisely locate individual specimens through use of GIS is a safeguard against many misfortunes. For while plant labels provide the link between a plant and its plant record, spatial data allow for field identification of all surveyed plants, even in the absence of labels. This is particularly important, as labels often fall off, are vandalised or become illegible, and for many Gardens it is a constant challenge to maintain a 100% labelled collection without slipping into arrears. GIS-databases enable Gardens to keep their inventories current, and to maintain the ability of Gardens staff to identify plants in the collections they curate. This is particularly important for Gardens which lose institutional memory, or capacity, as these losses are mitigated – at least in part – by the Gardens documentation management system.

Support for the ArcGIS project is fundamental to many of the challenges the Gardens face. Unless our collections are documented professionally, then our ability to curate them comparably with those of the world's top gardens will decline, and so too will our own international reputation. As global environmental concerns intensify, Gardens will increasingly be called upon to contribute to conservation, education and research – all of which depend on standards of curation. The ability of the Gardens to promote itself and remain part of the global botanic gardens community depends on the work that is being undertaken as part of the ArcGIS project. Because in the absence of documented collections a Botanic Garden is only a park.



Image by Clinton Friedman

Nicola Lawton, GIS special collections co-ordinator and Denis Bodeker, Manager Corporate GIS examining an ArcGIS layout of the Durban Botanic Gardens

Collections & Conservation – a documented collection pays dividends for the Gardens

In 2013, at the request of the Durban Botanic Gardens Trust, independent assessors Avis Nel and Terry Andrews surveyed the Durban Botanic Garden's cycads with a view to improving the management, protection and display of this special collection.

As part of this work, over 900 nursery plants were catalogued, re-potted and grouped; while Garden specimens were located, cleaned and pruned in preparation for documentation. Plants were given Garden numbers and GPS positions, and were identified, sexed, photographed, and measured for width, height and the status of their offsets, or pups. All permit requirements for the collection have been met so that long-term management goals can be established and legally pursued.

These efforts at curation form the bedrock of a collection's value to the Gardens, and enhance both its educational and scientific potential.

Currently, the Garden's Cycad collection is the focus of a project initiated by a group of UKZN researchers led by DBG Trustee Dr. Sershen Naidoo of the UKZN School of Life Sciences. The motivation for the study lies in the high conservation priority status of cycads, many of which are listed in the IUCN 'Red Data' categories of 'endangered', 'vulnerable' or 'rare'. These categories are attributed to habitat loss due to land use change and extensive (usually illegal) removal of mature plants from the wild by plant traders. In the face of these jeopardies, conservation efforts are hindered by the unresolved status of much of cycad taxonomy, with even the major, relatively well-known Cycad genus, *Encephalartos*, requiring systematic work.

The lack of information on Cycad seed biology is of particular concern, since plant germplasm conservation is most often achieved via seed storage. Similarly important is the need for better propagation from seed, as cycads thus produced can be used to mitigate the demand for wild-collected specimens, supply traditional and horticultural demand, and provide material for re-introduction into wild populations. Re-introductions from seed stock can also alleviate genetic deterioration in dwindling wild populations. The above mentioned benefits, however, require a sound understanding of cycad pollination, seed storage and germination biology. Parent plants used for seed supply need to be documented, of known provenance and genetically uncontaminated through cross-pollination with other cycads.

The Durban Botanic Gardens' Cycad collection meets a number of these requirements, lending itself to use by the UKZN team of microscopist Nelisha Murugan, cycad seed biologist Dr Wynston Woodenberg and plant taxonomist Dr Syd Ramdhani. They will be studying eight species from the genus *Encephalartos*, all of which are present in the Gardens in sufficiently large numbers for sample replication, and all of which are conveniently accessible within a small area.



Image by UKZN School of Life Sciences



Image by UKZN School of Life Sciences

Research specimens from the genus *Encephalartos* being used in the study



Image by UKZN School of Life Sciences

Honours student Joelene Govender and co-supervisor Mrs Nelisha Murugan, Manager of the Microscopy and Microanalysis Unit (MMU) at UKZN Westville Campus

The research gaps highlighted on the previous page provide ample motivation for the project, which has the following specific aims:

- using micromorphology to resolve taxonomic uncertainties among cycad species;
- improving methods for cycad propagation from seed (for reintroduction/conservation purposes);
- designing medium- to long-term seed storage methods;
- identifying biotic and/or abiotic factors that may be contributing to the decline of wild cycad populations.



Images by UKZN School of Life Sciences

Leaflets from research specimens (top) and an associated Scanning Electron Microscope image of a leaf surface at low magnification (bottom). Higher magnifications will also be used to describe micro-morphological differences between species by looking at stomata and trichomes.

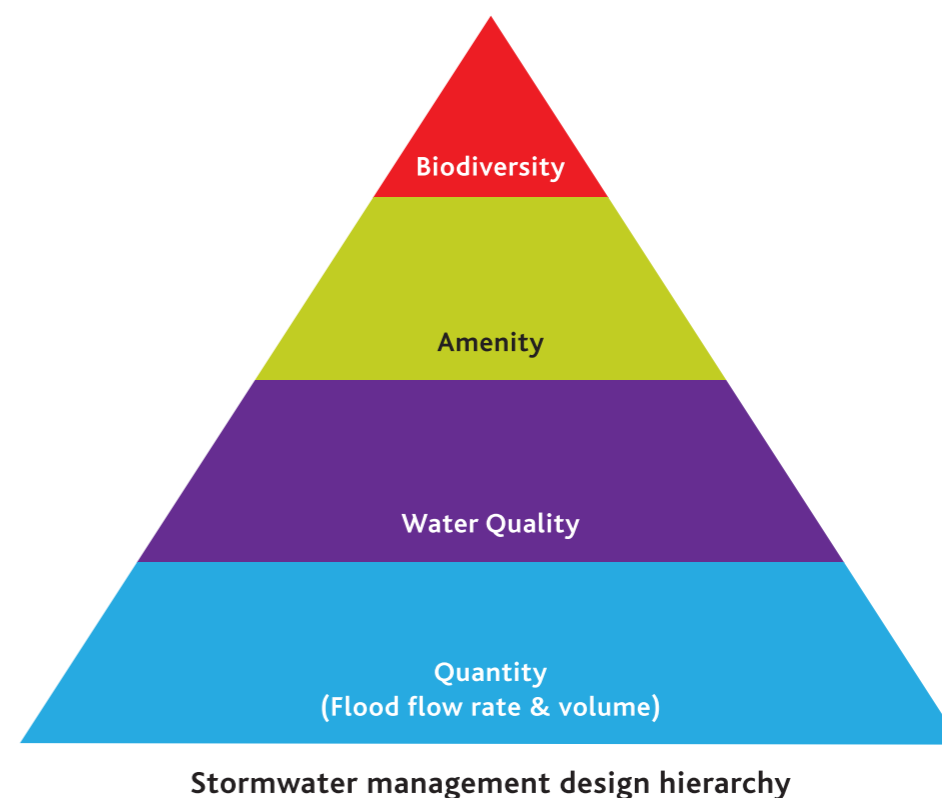
Additionally, the ‘fit’ between the research team’s needs and the collection itself is mirrored in the collaboration between UKZN and the Durban Botanic Gardens. Team leader Dr. Sershen Naidoo states that “The Trust aims to safeguard, publicise and encourage research on the Garden’s plant collections”, and “...given that the Gardens curate one of the world’s most impressive cycad collections, it is fitting that the DBG takes the lead in facilitating research on African cycads.”

While the project is being funded through UKZN in its initial stages, it is hoped that this research will provide impetus for the creation of a South African Cycad Research Centre (SACRC) as a joint project between UKZN and the Gardens, and for which funding will be sought.

A River Runs Through It – Sustainable Urban Drainage and the Garden’s water supply

Sustainable Urban Drainage systems (SUDS) are design practices used to mitigate and manage the high volumes of rainwater runoff that occur in urban areas. Urbanisation replaces permeable natural surfaces with hard, impermeable ones (e.g. concrete, paving, roofs, gutters, roads) that feed into stormwater drainage networks (pipes) and canals.

This approach to rainwater runoff management leads to water pollution, a loss of vegetation and biodiversity, and reduced amenity. SUDS attempt to reverse this situation by managing runoff at source, slowing and filtering it in a manner that mimics the natural environment. In so doing SUDS support biodiversity, amenity and water quality, and create more liveable urban environments. Such approaches are becoming standard practice in parts of Europe, Australia and America.



The SUDS approach initially seeks to manage runoff quantities at source through the use of rainwater harvesting, indigenously planted green roofs, soakaways and permeable paving (light blue). These source controls are supported by additional local controls such as indigenously vegetated swales, infiltration trenches, sand filters and bio-retention areas, all of which are designed to enhance water quality (purple). At a regional level water quality is further improved through the use of detention and retention ponds, and constructed indigenously wetlands (purple). These natural management principles and water quality enhancements support improved amenity and biodiversity, both of which occupy the apex of the SUDS stormwater design hierarchy (see diagram) in which each level contributes to an improved and more sustainable drainage system. SUDS also help to improve urban micro-climates.

While eThekweni’s stormwater drain network is primarily a means of managing rainwater runoff, it also – under certain conditions – carries groundwater. Some of this groundwater enters the stormwater piping following its release, via sub-soil drains, from behind the many retaining walls that are part-and-parcel of the Berea Ridge’s suburban landscape. The slow release of this water maintains a base flow through the stormwater system that is constant, irrespective of rainfall. Thus, water flows down John Zikhali Road in stormwater pipes throughout the year, while the Gardens spends on average R500 000 over the same period to tend plants with precious potable mains water.

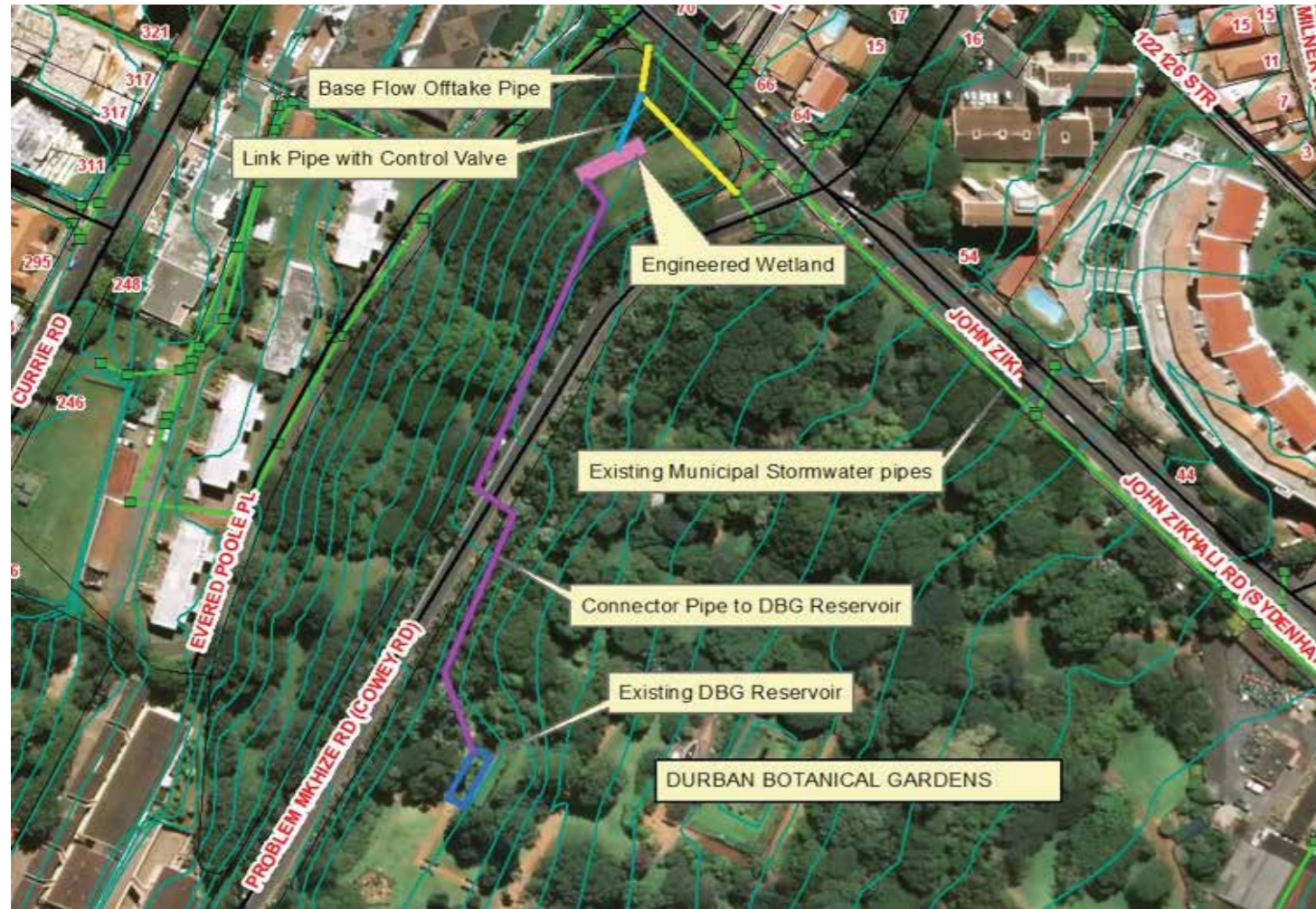


Image by eThekweni Municipality, Coastal, Stormwater and Catchment Management Department

This situation is soon to change, thanks to a project initiated by Geoff Tooley, a manager in the eThekweni Municipality's Coastal, Stormwater and Catchment Management Department. The Durban Botanic Gardens have been selected as a site in which to assess the feasibility of putting the stormwater system's base flow to use as part of the eThekweni Municipality's growing SUDS initiatives.



Image by Mark Mattson

School children on the Gardens' Environmental Education Programme collecting aquatic life from the Victoria Lily Pond. Beneath the pond lies the reservoir which will receive water from the bio-filtration units above Problem Mkhize Road. Part of the 1897 Jubilee Complex, the reservoir was completed in 1898 and is still structurally sound and fit for use.

Implementation will involve diverting available base flow from the stormwater system (shown in green) through an offtake pipe (yellow). Water quality concerns require that this water is treated, and for this reason it will be fed into engineered wetland units (see diagram) comprising plants and stone beds, to be placed in the Gardens above Problem Mkhize road. Because the efficacy of bio-filtration is determined by flow rates the link pipe (blue) will have a valve to control these. Once filtered, the water will be piped to the Garden's reservoir. Minor modifications to the existing reticulation will enable the Gardens to water plants and flush public toilets with the new supply, starting in 2018.

The pilot project has been further designed as a test case for the broader applicability of these methods in other parts of eThekweni in which old, unutilised reservoirs are still part of the City's infrastructure.

Music at the Lake – a retrospective

Even for regular, frequent visitors to the Gardens, attending a concert shifts your focus. Once you've experienced the Gardens pumping with sound from speakers as big as your house you can't look at them in quite the same way again. Perhaps it's because the tension between Nature and Culture breathes a sigh of relief and just lets go a little. Perhaps it's because all the anxious arguments about why the Gardens are so important are given a blessed day off; or that the Gardens get to take a break from being..... the Gardens, and are allowed to party for a while. Who knows?

Music at the Lake is big. More than anything else, it has transformed how the Gardens are seen by the multicultural many who call eThekweni home. Music has even, according to some, pushed the Gardens out of its own comfort zone, only for it to stumble, serendipitously, into, well...another one. In doing so, the Gardens has emerged as a much-loved venue for Durban's growing outdoor music market, diversifying user groups and garnering ever more supporters. Music invites multi-culturalism.



Old Mutual Music at the Lake with Jeremy Loops, images by Timothy Lubbe

Music's power in this regard is noted in the Corporate sector – As Old Mutual's Sponsorship Manager Bandile Mngoma put it, the Music at the Lake series takes place in "a multi-cultural comfort zone that is close to nature, family friendly and a top-class music venue." In this respect, Music at the Lake's delivery is instant – while longer-term projects must eyeball the uncertain future, music's invitation, as crowds were recently reminded by Veranda Panda's Liam Magner, is NOW.

And of course, NOW is huge, NOW is digital – think social media and the many, many, many things live music audiences do with their smart phones. And for potential sponsors, their brands are thus entrained into the online platforms and digital footprints of an annual 30 000 Music at the Lake concert-goers.

Music at the Lake currently attracts a broader demographic than at any point in its history, with Mafikizolo, Zakes Bantwini, Black Coffee, Ladysmith Black Mambazo and Hugh Masekela playing to sizable crowds. Perhaps reflecting on the power of music to unite people, Hugh Masekela described his concert as "... a major step forward for the Gardens in terms of opening up to all segments of society." In doing so, Masekela echoed Bandile Mngoma's observation that "the Durban Botanic Gardens has pushed boundaries in terms of what it stands for in today's South Africa" and this pushing of boundaries is a major value-add for sponsors. And for hard-core fans, venues are burned into their brains like Blake etchings –Mafikizolo at Bot Gardens is precisely that –Mafikizolo at Bot Gardens! Happily for corporates, this logic extends to them, and the nine concert season offers consistent brand-build, visibility, and a maturing brand-relationship with the Music at the Lake series.

CULTURE

But the Gardens provides more than this, offering a venue where nature and culture seem to be in accord, a theme that resonates strongly with many of the bands that have taken to the lakeside stage. Mango Groove's Claire Johnston, Johnny Clegg, Freshly Ground and Majazi, among others, have paid tribute to the natural setting, its importance to society, and the privilege of playing in it. For potential sponsors, such statements of appreciation feed into brand credibility via a product which brings together entertainment, the environment and the wider community. Additionally, a growing number of international acts are seeing South Africa as an opportunity to interact more intimately with fans. The recent, sold-out Mumford and Sons concert proves the point, and was a tribute to Impi Concept Events, the City, the Durban Botanic Gardens Trust and the Corporate and private sector participants who have collaborated around the Trust's Mission to bring a new relevance to the Gardens.



Image by Timothy Lubbe
Verandah Panda – Music is NOW!

This convergence of venue and values, Impi's Stu Berry believes, has driven an expansion of the green music business and assisted the Durban Botanic Gardens Trust to bring an additional 30 000 odd people annually through the gates. Confidence in the Gardens as a venue has led to plans for the construction of a permanent on-site stage which will allow for a more dynamic and expanded programme to create ever-new avenues of solidarity and support based on a reputation of multi-culturalism and international acts. The hosting of internationally playlisted artists adds growing value for sponsors, and a chance to stamp their brands on the City's expanding outdoor music market.

At the same time, Music at the Lake audiences are in touch with the local music scene, and ever-open to first-time acts; most support acts in 2016 and 2017 were home-grown KZN bands, all of which were assisted by the series to grow their exposure and careers.

A noteworthy example in this regard is the hugely popular SA band Subway Run, which first played in the Gardens two years ago, and then on two further occasions, opening for Arno Carstens and Jeremy Loops. As Subway Run's Freddy Lalendle says "most local bands would kill" for such an opportunity. This exposure helped move the band from niche performances in cafes, bars and small festivals into headlining their own shows on the national stage. Exposure through Music at the Lake led to increased bookings, festival appearances and interviews with magazines, newspapers and TV stations. But perhaps more importantly, the band's experiences in the Gardens helped to foster their self-belief, their determination to work hard and dream big.

Subway Run speak highly of the audiences the Gardens attract – "playing Botanic Gardens is such a privilege because you get to taste and feel the energy that the crowd brings" (Freddy Lalendle)



Image by Timothy Lubbe

The band has also grown through its relationship with the Garden's long-established Music at the Lake partner Impi Concept Events, and Freddy speaks of Impi's Stuart Berry as "a big inspiration who always believed in me". Reflecting on their long association, Freddy says "Stu is constantly challenging me in this industry; he'll never tell me what I want to hear and I'm blessed to have met him."

From L to R: Subway Run's Celene Ann Adams, Freddy Lalendle and Bradley Downs "sharing our talent in the presence of such beautiful nature" (Freddy Lalendle) at Durban Botanic Garden's Music at the Lake

Things are looking good for the band at the moment. Levels of motivation are high, some promising collaborations lie ahead, and Freddy's audition at Voice SA went global. But wherever Subway Run go, they are happy to acknowledge where it began; as Freddy says "Botanic Gardens will always mean a lot to us as artists."

As a more diverse spectrum of society identifies with the Gardens, the definition of a Botanic Gardens becomes more malleable, and can be shaped to move with the times, and to re-frame its relevance. For Africa's oldest surviving botanic garden this journey of change has been a privilege and an ongoing opportunity. And if music is a driving force - **play on!**

ABOUT US

The Durban Botanic Gardens Trust was established in 1993 as an Independent Discretionary Trust registered by the Master of the Supreme Court to ensure the stewardship and on-going development of the Durban Botanic Gardens – Africa's oldest surviving botanic garden.

HOW CAN YOU SUPPORT US?

MAKE A DONATION TO THE DURBAN BOTANIC GARDENS TRUST

By donating to the Trust you are investing in the future work of the Trust in areas of plant conservation, education, heritage, research and horticultural excellence. You can choose to make a monthly, annual or once off donation.

SPONSOR A PROJECT

The Durban Botanic Gardens has many projects in need of your support. By choosing a project close to your heart you will be able to help the Durban Botanic Gardens Trust provide essential support to key projects in the areas of biodiversity, education, horticulture and heritage.

CORPORATE PARTNERSHIPS

Is your organisation focused on building communities and a greener future?
We are! Would you like to become involved?

The Durban Botanic Gardens Trust is looking to develop corporate partnerships where we can work together to build a greener future.

SUPPORT OUR MEMORIAL BENCH PROGRAMME

Do you want to have your own special place within the Gardens to remember a loved one?

By supporting the Durban Botanic Gardens memorial bench programme you can.

To find out more, please contact Leigh Edy-Roderick _ Leigh.Edy@durban.gov.za _ 031 322 4014.

LEAVE A LASTING LEGACY

If you have a passion for the Durban Botanic Gardens we encourage you to help secure its future by leaving a bequest to the Durban Botanic Gardens Trust in your will. What better way to support Africa's oldest surviving botanic garden.

Contact: Kerry Phillips _ 031 309 9240 _ marketing@dbgt.org.za

PayFast internet donation: durbanbotanicgardenstrust.payfast.co.za

Donate by EFT/Debit order: Nedbank, Musgrave Branch [code 130126]

A/c number: 1301261246

A/c name: Durban Botanic Gardens Trust

Swift Code: NEDSZAJJ (for international donations)

Reference: Your full name

The Durban Botanic Gardens Trust is registered as a Public Benefit Organisation under Section 18A of the income tax act which permits all donations to be tax deductible. (Public Benefit Org. 930020769)