



Stellenbosch
UNIVERSITY
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UNIVERSITEIT

2022 _____
Annual Report

SCIENCE

EYENZULULWAZI NGEZENDALO

NATUURWETENSKAPPE

forward together • sonke siya phambili • saam vorentoe



Department of Botany and Zoology

Research Interests

Biotic diversity and ecology of the Cape Region and its coastline; Systematics and molecular ecology; Evolutionary ecology; Physiological ecology; Marine biology; Medicinal plant biology; Global change biology; Invasion biology

Research Highlights

Project Seastore: working towards understanding and reversing seagrass declines in South Africa

Seagrasses are important ecosystem engineers as they provide numerous ecosystem services, including supporting fisheries, improving and maintaining water quality, preventing erosion through binding sediment and helping in the fight against climate change.

Forming part of Vegetated Coastal Ecosystems (along with saltmarshes and mangroves), seagrasses play a critical role in capturing and storing carbon and are of particular interest in the mitigation of and adaptation to climate change. However, in South Africa the major seagrass (*Zostera capensis*) is not only understudied, but like many seagrass species globally, is also on the decline, with a loss of associated ecosystem services.

Zostera capensis is only found in estuaries, which face both marine and terrestrial threats, such as pollution, changes in water flow, habitat destruction and climate change. Through our NRF funded research, Project Seastore aims to better understand some of ecological, physiological and genomic aspects of *Zostera capensis*. Through an integrated and collaborative approach we are investigating the impacts of global change drivers on seagrass persistence, including

for example microplastics and herbicides. An important objective of our project is to initiate the restoration of seagrass meadows: several trials in estuaries around South Africa are already underway to investigate how *Z. capensis* can best be restored. We are building capacity for estimating the carbon contribution of seagrass meadows for inclusion in the National Blue Carbon budget. Since 2019, this project has supported three PhD, five MSc and ten Honours students and built strong collaborations with colleagues from Nelson Mandela University, University of Cape Town, South African National Parks and the University of the Western Cape. – Prof Sophie von der Heyden



Intertidal and subtidal seagrasses adjacent to a saltmarsh at the Berg River Estuary.



Thermoregulatory strategies such as shuttling between microsites and evaporative cooling by panting, as illustrated by the lizard *Agama atra* are likely to not be sufficient to buffer acute thermal stress imposed by intense heat waves

New predictions of temperature effects on animal death rates

Ectothermic animals such as reptiles, amphibians and insects rely on surrounding conditions to regulate body temperature. These organisms have multiple strategies to cope with temperature fluctuations, including behaviours such as thermoregulation and dispersal, but also adaptive physiological changes through acclimation and evolutionary responses. However, the fast increase in the severity, frequency and duration of heat waves associated with climate change means that these organisms are exposed to temperature extremes with potentially severe consequences for their survival.

While changes in average temperature can negatively affect the well-being of ectotherms, by for example reducing their body condition, growth and reproductive rate, extreme temperature events can impose acute stress that results very quickly in death. These fast rates of mortality occurring at extreme temperatures have only recently been assessed quantitatively for many species across large geographic scales. These data revealed that the rates of mortality to acute heat stress are extremely high, and therefore, when ectotherms are exposed to these extremes, there is little room for recovery, typically leading to mass mortality of local populations.

In an invited commentary in the premier journal *Nature*, Prof Susana Clusella-Trullas summarised these results and highlighted priority areas for investigation, such as the processes leading to individual death caused by extreme temperatures. For example, what are the thresholds between mild or permissible temperatures and those that are highly stressful, and therefore leading to fast heat failure, across species? What is the order of cellular and functional breakdown mechanisms that lead to death when acutely exposed to temperature extremes? Are there periods of recovery that can compensate for thermal injury imposed by temperature extremes and do these vary between marine and terrestrial species? These questions are at the heart of better understanding how animals may

respond to intensifying and often stochastic temperature extremes, and therefore, the impact that climate change will have on life on earth. – Prof Susana Clusella-Trullas

Understanding the rise of grassy ecosystems since the Miocene

Frequent fires in savannas limit tree cover and promote grassy vegetation, while forests and thickets form dense canopies that reduce flammable C4-grass fuel loads, leading to a lower probability of fires. However, rare extreme events, such as extreme fires, can cause substantial tree mortality in forests and thickets, making repeat fires more likely. This study, carried out in Hluhluwe iMfolozi Park, analysed whether an extreme fire event could alter species composition, vegetation structure, and fire regimes of closed-canopy ecosystems in an intact savanna-forest-thicket mosaic, or if successive fires were necessary to trigger a biome transition between forest to savanna.

Results showed that forests that only burned once recovered, whereas those that burned again following an initial extreme fire transitioned from closed-canopy forests towards open, grassy savannas. Additionally, the colonisation of the savanna tree community lagged behind the grass community but began to appear in areas that were once forest by the end of the study. These findings suggest that rare extreme fires, followed by repeated burning, can result in savannization in places where savanna and forest represent alternative stable states. This work has implications for our understanding of the rise of grassy ecosystems since the Miocene, particularly in systems where megaherbivores are present, as well as providing insights into the mechanisms behind catastrophic regime shifts in savanna-forest mosaics.

The paper titled "Pathways of savannization in a mesic African savanna-forest mosaic following an extreme fire" by Heath Beckett, Carla Staver, Tristan Charles-Dominique and William Bond has been shortlisted in the Top 10 for the John L. Harper Early Career Researcher Award from the *Journal of Ecology*. – Dr Heath Beckett



Intense fire burning up a slope at night in September 2012 in Hluhluwe iMfolozi Park.

Comparative phylogeography of selected codistributed ectotherms reveals asynchronous cladogenesis

Landscape heterogeneity in conjunction with climatic fluctuations can act as a major driver of speciation. Within the Western Cape, the Cape Fold Mountains have been shown to pose a barrier to gene flow in several individual studies, but a larger comparative review, including multiple species and investigating the relationship between the observed patterns and historical climatic changes, has not yet been conducted.

MSc student Angus Macgregor Myburgh, supervised by Prof Savel Daniels, investigated the impact of the Cape Fold Mountains as a barrier to gene flow, and the synchronicity of species divergence events with respect to historic climatic fluctuations. The results were published in a first author manuscript in *Evolutionary Applications* titled "Between the Cape Fold Mountains and the deep blue sea: comparative phylogeography of selected codistributed ectotherms reveals asynchronous cladogenesis".

It was found that the Cape Fold Mountains do indeed pose a major barrier to the dispersal of ectothermic species, with all study species displaying a clear pattern of isolated eastern and western evolutionary groups. Additionally, it was found that there were three main, shared divergence events between these two groups across thirteen species, indicating a shared response to environmental factors. The estimated times of these divergence events aligned with historical periods of increased glaciation and lowered sea levels, supporting the hypothesis that a periodically accessible land bridge at the southern tip of the Cape Fold Mountains has served as an effective dispersal corridor. Finally, they constructed species distribution models and, using historical climate data, identified areas of relative climatic stability which may have been utilised as refugia and which can be used to guide conservation efforts. – Prof Savel Daniels



Chersina angulata, one of the study taxa used in the study.

Junior Captain Scott Memorial medal for best MSc dissertation

Ms Amoré Malan received the Junior Captain Scott Memorial medal for the best MSc dissertation at a South African university during 2022. For her research she investigated the mechanisms responsible for speciation in the southern hemisphere brown fur seal, *Arctocephalus pusillus*. In terrestrial systems speciation is often correlated with geographic isolation of two or more groups of individuals, but in the marine environment clear barriers to dispersal are often lacking. The results of this study were published in *Biology Letters* in an article titled "Palaeoclimatic changes resulted in range expansion and subsequent divergence in brown fur seals, *Arctocephalus pusillus*". It was clearly shown that the two recognised fur seal subspecies, one restricted to Australia and the other to South Africa, have very limited gene-flow. Her research convincingly showed that the southern African fur seal represent the ancestral population for this species and that the Indian Ocean currently acts as a gene-flow barrier between the two populations. Lower sea levels during the last Glacial Maximum provided more exposed landmasses that allowed the species to colonise Australia approximately 15 000 years before present. The study provided compelling evidence that glacial cycles and oceanic distance are two major forces contributing to speciation in some marine species. – Prof Conrad Matthee

Cluster roots are an adaptation to extreme environments

Plants form the basis of global productivity, by utilising their capacity to convert carbon dioxide into valuable oxygen allows for 95% of all life on earth to exist. One of the key aspects to plants is their need for different nutrients. These are divided into two main groups: macro- and micronutrients, of which macro-nutrients are needed in the largest quantity. Some of the key macro-nutrients, such as phosphorus and nitrogen, comprise of several important factors that enable plant functioning. These two nutrients are, however, the biggest constraints to plant growth and functioning, whereby limitation of either of these two would cause a plant to die. This is especially important from an agricultural perspective, as most fertilisers contain both nutrients.

Nitrogen is one of the most prevalent nutrients on earth. However, due to its triple bond it can only be utilised and converted into usable form by a select few micro-organisms in a process called biological nitrogen fixation. On the other hand, phosphorus is less prevalent and due to its extremely slow regeneration periods it is expected that by 2100 the world would deplete its phosphorus supply, greatly influencing food security.

Certain environments are inherently nitrogen and phosphorus poor, these include South Western Australia, regions of South America and the Fynbos biome endemic to South Africa. Within these environments, plants have a suite of traits that allow for their standing in this environment, namely mycorrhizal fungi, nodules and cluster roots. These

three adaptations are represented in 99.5% of all species that occur natively in these environments. Through symbiosis with mycorrhizal fungi, plants can enlarge their sphere of influence in the soil by increasing soil exploration for both phosphorus and nitrogen. The bean family (*Fabaceae*) is renowned for its symbiosis with micro-organisms housed in nodules, where atmospheric nitrogen is converted into usable forms.

The last adaptation that plants in this environment have is cluster roots. Cluster roots are a term given for a bottlebrush root structure, where the rootlets are highly compacted and in close to each other. These roots are a specialised adaptation to increase phosphorus mobilisation and recycling in the soil and in the plant itself. The release of various different compounds such as organic acids, protons and enzymes from plant roots in these environments, are effective biochemical tools for obtaining and recycling sparsely available phosphorus. It has been shown that plants with cluster roots have a significantly lower total phosphorus requirement than other species.

Work conducted on cluster roots of several South African species, namely the King Protea and Rooibos, has shown that cluster roots additionally provide a plant with nitrogen conversion processes. This further enhances the role of cluster roots as an adaptation to extreme environments where phosphorus and nitrogen is lacking. Utilising cluster rooted species as a study system, the identification of different adaptations for circumventing excessive phosphorus use and increasing phosphorus acquisition can be utilised in important agricultural species. This could extend our phosphorus supply further and promote food security for future generations. – Dr Stian Griebenow



Nodules and cluster roots of Rooibos plants.



Cluster roots of the King Protea taken before removal and close-up.



Scelletium growing in the wild in its typical growth form, hidden beneath another larger shrub for protection.

Wide variations in chemical composition of Scelletium

The search for interesting chemistry and pharmacological actions from medicinal plants that can help with mental health is ongoing. Peering into our rich traditional medicine system in South Africa may hold the answer to the chemical diversity we are in search of. One such plant with fascinating chemistry that could help with anxiety and depression is *Scelletium*.

Scelletium is an ancient medicinal succulent plant that was used by the Khoi and San people on long hunting trips as a hunger and thirst suppressant. Occasionally, however, *Scelletium* was used recreationally as a mood elevator. It is this mood elevation activity that sparked research to understand its mood elevation activity.

PhD student Kaylan Reddy, supervised by Prof Nox Makunga, investigates how the chemistry and genetics of this group of medicinal plants varies across South Africa. From the research thus far, it was observed that the chemical composition of *Scelletium* differed across populations collected. Furthermore, by simulating the parts of the brain and spine that control anxiety and depression computationally (*in silico*), it was suggested for the first time, that minor chemicals in the plant could be responsible for helping with anxiety and depression. Within *Scelletium* there are two chemical classes that it produces, the major alkaloids (mesembrine) and minor alkaloids (Joubertiamine, Scelletium A4 and Tortuosamine). With the chemical mesembrine being in the highest proportion and being most investigated, it is important to industry and is preferred over plants with chemical Profiles that are low in mesembrine.

Across populations and species these chemical Profiles differ in terms of the type of alkaloids as well as their concentrations. These differences in chemistry are suspected to be influenced by physiological stresses such as UV intensity and nutrient stress in the environment. Some populations of *Scelletium* contained a diversity of minor alkaloids. The findings of the PhD study and *in silico* results suggest that minor alkaloids will preferentially bind to the receptors (GABA-A, SERT, AChE) that control anxiety and depression over major alkaloids. This new perspective shifts the narrative to the compounds in *Scelletium* that may hold medicinal potential to help with mental health.



Photo: Hamish Robertson

Ocymyrmex flaviventris from Dregghorn, Northern Cape.

Unravelling the biogeographical history of the southern African ant genus *Ocymyrmex*

Africa has undergone major environmental changes associated with fluctuating historical climatic conditions, which influenced ecosystems and the distribution of many species within them. These paleoclimatic changes are considered to be some of the major drivers of species diversification and regional diversity patterns.

Nokuthula Mbananya-Nhleko, a student in Prof Theresa Wossler's lab, focused on an endemic ant fauna that includes species in the genus *Ocymyrmex*. Currently, there are 34 described species of *Ocymyrmex* that are considered valid. The taxonomic status and phylogenetic relationships among *Ocymyrmex* species were reviewed. A highly resolved and supported phylogeny for the genus was recovered. Four of the currently described species were shown to be conspecific, requiring synonymisation. This study also provides an updated species-level identification key, including the description of six new species. Further, the genus has higher species diversity in the western arid regions of southern Africa compared to tropical and subtropical parts of the continent.

The processes that produced these patterns of diversity and distribution of arid adapted ants in southern Africa have never been assessed or analysed. The results suggest that *Ocymyrmex* species likely originated in the arid regions of south-western Africa during the Oligocene (around 32 Ma). Subsequent paleoclimatic changes and topographic heterogeneity during the Miocene, which led to habitat changes, likely drove diversification in the genus. Key life-history traits are therefore expected to mimic this diversity. The physiological traits measured in this study were similar across the *Ocymyrmex* species. High thermal tolerance,



Photo: Simon van Noort

Dr Nokuthula Mbananya-Nhleko digging up *Ocymyrmex* nests in the Leon Taljaard Nature Reserve near Vryburg in the North-West Province of South Africa.

long chain hydrocarbons and high abundance of alkanes are physiological adaptations for all *Ocymyrmex* species irrespective of where they occur and hence there was no phylogenetic signal for these traits. The results from this study suggest that *Ocymyrmex* ants may have experienced strong selection for arid-adapted traits. Dr Nokuthula Mbananya-Nhleko is currently the Curator of Entomology at Iziko Museums of South Africa. – Prof Theresa Wossler

Research Activities

Prof Allan Ellis gave his inaugural lecture titled "Dazzling daisies and forlorn flies: Namaqualand tales of unrequited love". He also gave talks at the Mediterranean ecosystems (MEDECOS) conference, and at the Royal Museum of Central Africa in Belgium and the University of Hamburg in Germany.

Prof Susana Clusella-Trullas is on the editorial advisory board of the *Journal of Experimental Biology*. She presented a plenary at the Research School of Biology at the Australian National University titled "Thermal vulnerability indices and the elephant in the room" as part of an international working group on thermal tolerance. She was invited to write a News and Views article for *Nature*, titled "The point of no return for species facing heatwaves".

Prof Leanne Dreyer was interviewed on RSG radio with PhD student Brian du Preez during Woodfees. The title of

the interview was "Fire in Fynbos". Prof Dreyer serves on the editorial board of *Botany Letters* and frequently gives media interviews. She manages the Stellenbosch University Herbarium and is on the advisory board of the Stellenbosch University Botanical Garden.

Prof Carol Simon is the chair of the local organising committee of the 14th Polychaete Conference to be held in Stellenbosch in 2023. She presented two papers at the 17th South African Marine Science Symposium in Durban

Miss Zaynab Shaik presented her midway PhD lecture at the Gothenburg University titled "Extensions of the multispecies coalescent for species delimitation and inferring trees under the isolation with migration model". She received a research grant from the Southern African-Nordic Centre.

Prof Tammy Robinson-Smythe was appointed as Research Chair: Managing Invasions in Protected Areas.

Academic Affairs

Student Information 2022



20
Honours
students



35
MSc
students



35
PhD
students



14
Postdocs
students

The Department of Botany and Zoology continues to support the School for Climate Studies, which aims to create a transdisciplinary capacity that will combine the climate-related knowledge systems of SU faculties, public sector climate policies and initiatives, private sector climate redress and innovation capacities, and SU's social impact mission, in both academic and applied ways – all in support of the transition to a climate-resilient society and a low-carbon economy. This inter-Faculty entity is hosted in the Department under the directorship of Prof Guy Midgley, who likewise holds a 1/8th position within the Department. The School for Climate Studies was involved with the Conference of the Parties (COP27) in Egypt in November 2022 in various activities, in collaboration with the Global Alliance of Universities on Climate (GAUC).

Awards to Staff and Students

Prof Brian van Wilgen was awarded the National Research Foundation Lifetime Achievement Award for his outstanding contribution to the development of science in and for South Africa with respect to his research contributions in the fields of ecology and biological invasions.



Prof Brian van Wilgen (middle), recipient of the NRF Lifetime Achievement Award 2022. On the left is Mr Buti Manamela, Deputy Minister of Science and Innovation, and on the right is Dr Fulufhelo Nelwamondo, Chief Executive Officer of the National Research Foundation.

Caitlin Ching-Sent received the Zoological Society of South Africa (ZSSA) award for the best Honours student at SU, while **Isabella de Beer** received the ZSSA award for the best third year student at SU. **Arjan Engelen** received the Department's best MSc talk award at the Annual Research Meeting. **Jamila Janna** won the Best Student Poster award at the South African Marine Science Symposium and the Best Student Presentation Award at the Western Indian Ocean Marine Science Symposium. **Amoré Malan** received the Junior Captain Scott Memorial medal for the best MSc dissertation at a South African university.

Prof Guy Midgley received the Green Economy Award at the National Science and Technology Forum (NSTF)-South32 Awards ceremony. The Green Economy Award is given in recognition of outstanding work in trans-disciplinary research or human capital development that promotes

environmental sustainability within an academic or non-academic context. He also received an Eco-Logic award at the same function. He was elected as president of the JRS Biodiversity Foundation, an independent grantmaking foundation based in the United States that awards grants to increase the access to and use of biodiversity information in sub-Saharan Africa. He was also introduced as editor-in-chief of the *African Journal of Climate Studies*.

Dr Nasreen Peer won the South African Network for Coastal and Oceanic Research (SANCOR) Young Researcher's Award. **Kaylan Reddy** won the first runner-up award in the FameLab South Africa National Finals. **Catherine Wilkinson** was awarded the Department's best PhD talk at the Annual Research Meeting. **Prof John Wilson** was nominated a Fellow of the Royal Society of South Africa.

Staff Matters

Saudah Jacobs, departmental secretary, resigned to take up a position at Facility Management. **Chandré Engelbrecht** was appointed senior secretary in the Department of Botany and Zoology in 2022.

Social Impact

The Global Alliance of Universities on Climate (GAUC)

Students of climate change impacts will soon need to step into roles in which they can advise our country's negotiators and ensure that the African perspective and needs are accounted for in global policy. To this end, they need to be trained to understand how global policy discussions work, and how their research can best be used to inform policy.

In 2022, Nosipho Gqaleni, Olivia Jones, Yenziwe Mbuyisa, and Kayleigh Murray took part in a pilot training programme hosted by the Global Alliance of Universities on Climate (GAUC). The alliance is made up of 15 leading universities from around the world that have a dedicated focus to transdisciplinary climate change studies. Member universities include Columbia University (USA), Cambridge (UK), and Tshingua University, (CH).

The Climate X Leadership pilot training program was established to give students practical training in disciplines related to climate change from the research frontiers of these fields. The aim of this training is to give students the knowledge and skills necessary to enter climate change negotiation spaces and develop themselves as leaders and advocates for policy that will affect change from respective fields of expertise. The course brought students from different disciplines and countries together to investigate solutions to the issues posed by climate change, and to better understand how to pursue the research and policy landscapes.

The students also attended the United Nations Framework Convention on Climate Change (UNFCCC) 27th conference

of the Parties (COP27) as GAUC ambassadors with Prof Guy Midgley and Ms Kerry-Anne Grey (SU's GAUC organiser). Both took part in panel discussions held by GAUC during COP27, which was attended by various delegates and dignitaries from across the world. Overall, the GAUC program was a valuable introduction to policy and negotiation discourse. – *Kayleigh Murray and Yenziwe Mbuyisa*

LiTHOPS – Learning, Teaching and Opening Science

There is often a big gap between what happens in the academic sphere in science and what people tend to be informed about; and such gaps are often the result of disinterest, miscommunication, and ignorance. Access to excellent Science, Technology and Mathematics (STEM) education at school level is often delineated on socioeconomic lines. Huge disparities may exist when comparing how natural sciences are taught in different schools and this can lead to a disregard for the natural world. We believe one of the ways in which this problem can be resolved, at least in part, is through active sharing of knowledge to a wide audience in an accessible environment, by passionate people who are active in researching a wide variety of topics associated with plant and animal biodiversity.

LiTHOPS as a social impact initiative was launched in 2021 and piloted at several schools in a series of short, informative, engaging, and inclusive talks during 2022. Through research talks, teaching and assistance classes and informative tours, LiTHOPS as a social impact initiative strives to bring learners from local schools on an equal footing concerning subjects associated with life sciences. – *Prof Nox Makunga*



Four postgraduate students were selected for the GAUC programme: Olivia Jones, Nosipho Gqaleni, Yenziwe Mbuyisa and Kayleigh Murray.

limbovane Outreach Project

limbovane is an education programme that provides curricular support to educators and helps learners develop practical science skills in the field of biodiversity and invasion science. limbovane had several highlights in 2022 and remains a valuable science education initiative of the Department of Botany and Zoology.

In 2022, limbovane trained 921 Grade 10 learners through classroom lessons and field studies in their respective schoolgrounds. Besides increasing the learners' content knowledge during the classroom lessons, limbovane also helped them develop important practical science skills such as measuring, collecting biological samples, following a scientific protocol, analysing data, and using microscopes and using scientific keys to identify species.

limbovane's educational impact was enhanced through four multiday workshops during the school holidays. These workshops, held at Grootvadersbosch Nature Reserve, Bainskloof and Kylemore, were attended by 61 learners. During these workshops learners conducted mini-research projects in different ecosystems and collected biodiversity and environmental data using various methods. The learners also got to identify plant and invertebrate species, giving them hands-on experience with the use of field guidebooks and microscopes. The practical part of looking at the species and then identifying them complemented their theoretical understanding of how living organisms are classified, which forms a large part of their school Grade 10 Life Science curriculum. The interactive nature of the research projects allows the learners to learn hands-on skills while collaborating and solving problems as a group. Learners also received valuable training in the use of computer programmes such as Excel and PowerPoint. Many of these learners have never worked on computers before and will now be able to prepare class assignments and presentations using the computer skills they gained during their participation in limbovane.

Feedback from learners attending these holiday workshops emphasise the value of such holiday programmes in helping them to develop skills which they otherwise would not have been able to do.

"Today I improved my microscope skills. I learned how to make a Powerpoint, learning about insects isn't as easy as you think it is. There's way more to an ant than just a small insect. I never knew it would be that hard just to identify a specific ant - well, I guess these small things are the ones with the most difficulty."

"I learned today that there are five different ways of capturing different types of insects, most commonly insects captured are the 'ants'. The five different ways are baiting, vacuum, sweep nets, beating and pitfalls. I also learned a plant's name called 'noem-noem' and I saw for the first time a forest tree fern. I learned how to identify plant and invertebrate species."

In 2022, limbovane continued to work closely with its education partners which led to the co-hosting of several workshops with CapeNature, Nature Connect and Cape Leopard Trust. In addition, the project team were also approached by private schools and home-schooler groups for day programmes on local biodiversity and invasive alien species. Through these collaborative workshops and day programmes, limbovane trained a further 142 learners.

Educator training also formed an important aspect of 2022's activities. In April, limbovane provided two days of training to the SU's Post Graduate Certificate in Education (PGCE) students. This training equipped the students (and future educators) with the necessary skills to present a practical field investigation for learners and was attended by 44 students. limbovane also allowed six students to assist with its holiday workshops, thereby giving them practice and mentorship in planning and implementing a practical investigation on biodiversity. A further 121 educators were trained through educator training workshops presented by the limbovane. – *Dorette du Plessis*



Photo: Dorette du Plessis

Mogau Motlatla, a student enrolled for a Postgraduate Certificate in Education, learning to differentiate between different fynbos species in preparation for an limbovane workshop.

PhD student **Kaylan Reddy** was interviewed on Cape Talk in a segment called 25@25, where they interviewed 25-year-olds about their career paths and aspirations. Kaylan also presented his research at the FynbosLIFE Fair for Garden Day and spoke about his journey as a student and researcher at the TEDxYouth Summerveld, in partnership with the University of KwaZulu-Natal, in a presentation titled "The Art of blooming where you're planted".

Collaboration

Angola/Botswana/South Africa

Wild Bird Trust Okavango Research Project

Australia

Macquarie University
RMIT University
University of the Sunshine Coast

Belgium

Royal Museum Central Africa

Brazil

Federal University of Rio de Janeiro

Canada

University of Toronto

China

The University of Hong Kong



Photo: Dorette du Plessis

Learners attending limbovane workshops learn how to use a "pooter/vacuum" and a sheet to collect invertebrates.



The **Global Alliance of Universities on Climate (GAUC)** is made up of **15 leading universities from around the world** that have a dedicated focus to transdisciplinary climate change studies

Czechia

The Czech Academy of Sciences

France

Sorbonne University
Université de Rennes 1
Université Toulouse, France

Germany

Friedrich-Alexander University Erlangen-Nurnberg, Germany

Hungary

MTA-MTM-ELTE Research Group for Paleontology

India

Wildlife Institute of India

Italy

Institute for Sustainable Plant Protection

Japan

University of the Ryukyus
Natural History Museum

Kenya

Kenya Marine and Fisheries Research Institute

Mozambique

Eduardo Mondlane University

Nieu Zealand

University of Auckland

Norway

Nord University
Norwegian University of Science & Technology

Portugal

Universidade do Porto (CIBIO)

Republic of Palau

Palau International Coral Reef Centre

Scandinavia

University of Gothenburg

Senegal

Cheikh Diop Anta University

South Africa

Agricultural Research Council
Kwazulu-Natal Museum
Nelson Mandela University
South African National Biodiversity Institute (SANBI)
University of Cape Town
University of the Free State
University of KwaZulu-Natal

Funding

Australian Research Council
Belgium Directorate-general Development Cooperation
Botswana Wild Bird Trust
Centre for Energy Technology (CEBRA), Germany
Department of Science and Innovation
Escom Annual Koeberg Monitoring
Human Frontier Science Programme
Marine and Coastal Research
National Research Foundation

University of Pretoria
Wild Bird Trust

Spain

University of the Balearic Islands

Sweden

Gothenburg Global Biodiversity Center

Switzerland

University of Fribourg

The Netherlands

KNMI, Netherlands (Royal Netherlands Meteorological Institute)
Wageningen University

Trinidad and Tobago

Caribbean Environment Science and Renewable Energy Journal

United States of America

University of Buffalo
University of Florida
University of Rhode Island
University of Vermont
US Forest Service
Washington University
Yale University

United Kingdom/Ireland

Cambridge University
Global Species Programme, Cambridge
Oxford University
University of East Anglia
University of Edinburg
University of Chester
University of Liverpool

Royal Museum of Central Africa
South African Institute for Aquatic Biodiversity (SAIB)
South African National Biodiversity Institute
Syngenta SA
Thünen Institute of Climate-Smart Agriculture
University of Pretoria
University of the Western Cape
University of Toronto
World Bank

NRF-rated Researchers

Leading international research	
Prof GF Midgley	Ecology and ecophysiology
Prof DM Richardson	Biological invasions and conservation biogeography
Internationally acclaimed researchers	
Prof BA Anderson	Plant-animal interactions
Prof S Daniels	Molecular systematics, phylogeography and conservation of invertebrates
Prof AG Ellis	Evolutionary ecology of plants and insects
Prof CA Matthee	Molecular systematics and phylogeography
Prof CA Pauw	Evolutionary ecology of plants and their pollinators
Emeritus Prof D Baird	Marine ecology
Emeritus Prof B van Wilgen	Biological invasions and conservation
Extraordinary Prof J Wilson	Biological invasions and conservation
Extraordinary Prof WJ Przybylowicz	Applications of nuclear microprobes in biology
Established researchers	
Prof S Clusella-Trullas	Thermal adaptation of ectotherms and implications for climate change
Prof LL Dreyer	Evolution of Cape Flora
Prof NP Makunga	Medicinal plant biotechnology
Prof TB Robinson	Drivers, patterns and impacts of marine invasions
Prof CA Simon	Marine invertebrate; reproduction and worm taxonomy
Prof S von der Heyden	Marine molecular ecology and conservation
Dr S Kumschick (CIB)	Invasion biology
Prof J Measey (CIB)	Conservation and ecology of invasive species
Extraordinary Prof L Foxcroft	Invasion ecology
Extraordinary Prof JM Mesjasz-Przybylowicz	Plant ecophysiology

Staff List

Academic

Prof BA Anderson
 Prof MI Cherry
 Prof S Clusella-Trullas
 Prof SR Daniels
 Prof LL Dreyer
 Prof AG Ellis
 Dr AF Flemming
 Prof NP Makunga
 Prof CA Matthee
 Prof GF Midgley
 Dr M Mouton
 Prof CA Pauw
 Dr N Peer
 Dr VR Rambau
 Prof DM Richardson
 Prof TB Robinson-Smythe
 Ms Z Shaik
 Prof CA Simon
 Prof S Von der Heyden
 Prof TC Wossler (Head of Department)

Academic Staff: Centre of Excellence for Invasion Biology

Dr S Kumchick
 Prof J Measey
 Prof J Wilson (Extraordinary Professor)
 Prof B van Wilgen (Emeritus Professor)

Extraordinary Appointments

Dr S Andreotti
 Dr S Elwen
 Prof W Foden
 Prof L Foxcroft
 Dr T Gridley
 Prof J Le Roux
 Prof W Przybylowicz
 Prof J Przybylowicz
 Prof JR Wilson

Emeritus Professors

Prof D Baird
 Prof J Gilomee
 Prof JAJ Nel
 Prof AJ Reinecke
 Prof SA Reinecke
 Prof TJ Robinson
 Prof VR Smith
 Prof DE van Dijk
 Prof B van Wilgen
 Prof H Van Wyk

Support staff

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 Ms C Engelbrecht
 Ms F Gordon
 Ms S Johnson
 Ms DJD Willemse
 Ms J Hutton
 Ms MJ Mathese
 Ms AC Nel

Mr R Robertson
 Ms MP Sauerman
 Mr N Solomons
 Mr JP Williams
 Mr H Witbooi

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