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Newsletter of the Faculty of Natural and Agricultural Sciences

September 2023

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Make today matter

Successful inaugural NAS Research Symposium holds great opportunities

See more on page 6

The inaugural NAS Research Symposium was a proud occasion for the Faculty, hosted as a hybrid event on 29 and 30 August in the SANLAM Auditorium on the Hatfield Campus. Dr Sekelwa Cosa from the Department of Biochemistry, Genetics and Microbiology was the programme director and guided everybody through their paces.

The symposium was designed to give a high-level overview of broad and emerging research topics in the Faculty. Not only did this approach show colleagues the full breadth of the excellent work happening in NAS, but our industry partners and stakeholders also got a sense of the cutting-edge research that we do. This symposium was the first step in a longer process to identify research focus areas of mutual interest to researchers and industry partners alike.

Prof Sunil Maharaj, Vice-Principal: Research, Innovation and Postgraduate Education, welcomed the attendees on the first day and emphasised that NAS contributes substantially to building research and teaching capacity in South Africa by producing highly skilled graduates and generating new scientific knowledge through our research. Around 20 to 25% of all PhD graduates at UP come from NAS.

He lauded the Faculty for this initiative and reiterated that NAS is a leader in addressing complex challenges through transdisciplinary and interdisciplinary research.

In his welcoming words, Prof Barend Erasmus, Dean of the Faculty of Natural and Agricultural Sciences (NAS), emphasised that “Being here today places a responsibility on each of us. We focus on transdisciplinary research; therefore, we must think actively of opportunities to link with our colleagues, get ideas and note action items to follow up. Secondly, the valuable information shared on philanthropist fundraising will assist you in raising real funding for your research. Today is a first step in connecting funding opportunities with our new research priorities and opportunities,” Prof Erasmus concluded.

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IN MEMORIAM

Read more about our ground-breaking research

RE.SEARCH is a digital magazine where the University of Pretoria highlight some of its impactful research, knowledge and solutions. Researchers from the Faculty of Natural and Agricultural Sciences (NAS) feature on pages 16 and 26 in this sixth edition, with this issue focusing on OPEN. Visit the Research Matters website for the first, second, third, fourth and fifth editions and more NAS and UP research.

Message from the Dean

Prof Barend Erasmus

"Make every day and opportunity count."

Spring has sprung... Promising new beginnings with the aromatic smell of blossoms in the air. This also aligns with new endeavours in the Faculty – NAS hosted its inaugural Research Symposium at the end of August. Current Faculty research was showcased while emphasising collaboration and engagement to enhance transdisciplinary and interdisciplinary research in NAS (page 1).

The months of June to August are usually when UP management plans for the following year. NAS' transparent and bottom-up planning process was recognised by external faculty reviewers in 2022, and this year was no different, with several opportunities to reflect on past progress and to innovate for 2024. The draft 2024 plan for NAS has been submitted, and we look forward to using it as an operational and tactical guide to ensure that we meet our strategic objectives.

In the recent Spring graduation ceremonies, our Faculty again proudly graduated high-quality graduates ready to enter the labour market, including 29 PhDs (among others, seven in Chemistry, four in Physics and three respectively in Entomology and Animal Sciences).

Our research endeavours continue to reach new heights. We feature exciting research in this edition, from decoding the genome of the king protea (page 12) to researching whether farmers choose compost made of human faeces (page 9).

Our global engagement is evidenced by the awards to NAS staff and students, including Prof Paxie Chirwa and Dr Daniel Hart, who won NSTF awards in their respective categories (page 20), being the only UP awardees this year. Prof Lise Korsten has made us proud as the new and first female African Academy of Sciences president (page 23). Many of our researchers attend conferences abroad and touch base with their global scholarly community during the boreal summer months.

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Teaching and learning remain a high priority. Academic staff had the opportunity to discuss and engage with the latest Integrated Academic Framework during the recent Teaching and Learning Roadshow. The UPstarters, an innovative platform to improve teaching skills and empower teaching staff in the Faculty, is also building momentum (page 30)

Another significant milestone for the University is the launch of the UP Digital Transformation Strategy, a strategic roadmap to enhance the institution's digital environment and cement its position as a University of the future (page 41). NAS will continue to innovate in response to digitalisation's opportunities for our core business of teaching, learning, and research.

Furthermore, the #UPGivingMatters Campaign, a three-year fundraising campaign to raise R100 million by 2024 to supplement UP's day-to-day fundraising projects, was relaunched in July this year. This offers financial assistance to "missing middle" students. R15.2 million has been raised so far and exceeded the target of 500 donor participation by 59% and 74% (795) from 2022 participation (page 43).

As part of the broader South African community, NAS celebrated Mandela Day on 18 July. Together with women from all over the world, NAS also recognised Women's Month in August. We focused on showcasing a few female staff members staff (pages 33-38) and sharing Mandela Day activities such as the NAS Little Library (page 39) and conserving biodiversity by clearing invasive weeds at the Innovation Africa campus (page 46).

Our students always make us proud. Mr Thys Steynberg received the Vice-Chancellor and Principal's medal for outstanding undergraduate academic achievement during his undergraduate studies in NAS (page 31). A former NATHouse Chair, Zeenat Patel, has been selected as a recipient of the 2023 Abe Bailey Travel Bursary (page 26). Postgraduate students impressed German funders when UP hosted the presidents of the German Academic Exchange Service (DAAD) and the Alexander von Humboldt Foundation, organisations which have provided funding for at least 41 UP PhD and postdoctoral students since 2010 (page 42)

We pay our respects to two esteemed researchers in our Faculty, Prof Rudi van Aarde (page 52) and Prof Rashid Hassan (page 54), who passed away, and we sympathise with staff and students who lost loved ones and colleagues in the past few months.

Only a few months are left towards the end of the year, so make every day and opportunity count. Make sure you include some time for rest in your planning for the rest of the year. Thank you for all your hard work and efforts to make NAS an excellent Faculty!

HIGHLIGHTS

29 PhD graduates during the Spring graduation ceremonies

2 NSTF award winners

1st female African Academy of Science president

R15.2 million raised through the #UPGivingMatters Campaign

Donor target exceeded by

74%

From page 1

Three sessions with four speakers each on different aspects of themes ranging from Next-Generation Agriculture, Energy, to the Environment and Biodiversity were on the first day's programme.

A highlight of the second day of the Symposium was the keynote address by the Director-General of the Department of Science and Innovation (DSI), Dr Phil Mjwara. He shared the Department's Science, Technology and Innovation (STI) decadal plan, which, interesting enough, has many similarities to NAS research priorities, such as modernising agriculture, energy, health and Big Data, among others.

Dr Mjwara explained the background to the decadal plan, "It is a highly complex, uncertain and rapidly changing context, ever since the 2019 White Paper with ongoing and worsening effects of climate change, widening global inequality and disparities, effects of COVID-19, Russia-Ukraine conflict, energy crisis, cost-of-living crises in many countries; and many more."

"We need to adapt to the disruption challenges of artificial intelligence. Globally, new approaches to the STI policy are emerging, such as a shift from a narrow focus on productivity and competitiveness and the role of the private sector in the economy towards STI, enabling just socio-economic transitions within more sustainable, inclusive and resilient socio-technical systems. The 2019 White Paper highlighted two priorities: continuing to develop the system and supporting research and enhancing the impact derived from STI to derive maximum impact from the NSI to help address SA's challenges."

Dr Mjwara emphasised that the DSI has pockets of excellence, and the intention is to continue with the development to support institutions and develop research capacity and high-end skills. He invited the Faculty and University to join these efforts and collaborations."

Prof Erasmus added to Dr Mjwara's address, pointing out the relevance of the STI decadal plan and reminded NAS researchers to familiarise themselves with this plan to ensure even better collaboration between government, industry and society.

From left: Dr Phil Mjwara (DG: Department of Science and Innovation), Dr Sekelwa Cosa (Programme Director), Prof Barend Erasmus (Dean: NAS), Dr Maneshree Jugmohan-Naidu (Director of Agricultural Biotechnology, DSI) and Prof Vinesh Maharaj (NAS Deputy Dean: Research and Postgraduate Education).

On the second day, the sessions focused on themes ranging from Health and Well-being; Food systems and Security and ended on a high note with a session on Big Data.

The Symposium was officially closed by Prof Vinesh Maharaj, NAS Deputy Dean: Research and Postgraduate Education, emphasising the importance of this inaugural event. "This is the first of many and was a great showcase of some ground-breaking research at NAS. We must continue with conversations and collaboration between the different departments in NAS and other faculties in the University. He also reiterated the significant alignment between the Faculty's and the government's priorities.

His final words of thanks went to all the role players that contributed to the success of the Symposium, ranging from the organising committee, speakers, session chairs, programme director and the sponsors, all contributing to making it a huge success.

For those who missed the event, both days are available online.

Watch Day 1
Watch Day 2

Research

Would farmers choose compost made of human faeces?

Rural farmers in KwaZulu-Natal said they would buy and use compost made from human sewage as long as they could be sure it is safe, affordable and works as well as other products on the market.

Researchers asked 341 farmers what influenced their choice of fertiliser or compost, and presented a compost made from human waste as one of the potential choices.

Dr Simon Gwara from the University of KwaZulu-Natal led the study, and called on UP researchers to assist with data analysis using a method called "choice experiments".

These experiments allow researchers to understand consumer choices based on how much they value specific characteristics of products, says Dr Gwara's co-author Dr Damien Jourdain.

Jourdain is an expert in choice experiments and choice modelling at UP's Department of Agricultural Economics, Extension and Rural Development.

The research team looked into whether farmers cared about the packaging of human compost, whether or not it was fortified with additional nutrients, and any potential health and safety risks.

"We found that farmers cared more about fortification and certification of human compost. Perceived health risks were a potential barrier to the use of compost in agriculture; therefore, certification would mitigate some of the safety concerns," says Dr Gwara.

Overall, the findings suggest that faecal sludge management businesses and other entrepreneurs within the waste value recovery chain should create human compost products that are more acceptable to farmers.

For example, human waste can be co-composted with other organic waste to ensure it is fortified with the proper nutrients and minerals. It could also be sold as pellets in packaging that resembles other commercial composts so that it doesn't remind farmers of human waste.

Clear safety certifications can also be placed on the products to put farmers' minds at ease regarding any real or perceived risks of using human poop as compost.

Dr Gwara had recognised the potential of the "choice experiments" approach for this study, and reached out to UP to collaborate on the design and analysis of the study after attending a seminar by Jourdain at the University of Pretoria back in 2018. UP's Dr Thomas Lundhede, an Extraordinary Professor in environmental economics, was also a co-author of this research.

What initially prompted Dr Gwara's desire to understand what consumers might value in human compost products was that such products could help address several critical socio-economic issues, including waste management, sanitation, agriculture and climate change mitigation.

This study is, therefore, a first step towards creating human compost products that are more "palatable" for farmers, and is an excellent example of how versatile and useful choice experiments are for market research, says Jourdain.

Jourdain and colleagues at UP have been working with PhD students across South Africa since that 2018 seminar to build capacity in choice experiments for agricultural economics, alongside the UP Department of Agriculture Economics, Extension and Rural Development, and the UP Centre for Environmental Economics and Policy in Africa.

"Personally, this work is very important to me, and I hope to establish a community of practice in South Africa through these student networks and with other people doing work on choice experiments," says Jourdain.

He says choice experiments are used widely elsewhere in the world, but it is only now emerging in Africa.

Some of his students are using choice experiments to study preferences around pasture insurance, illegal hunting and even rewilding animals in national parks. Many others are using choice experiments in health research. "So you see, it's quite versatile for very different settings to evaluate the diversity of preferences of different populations," he says.

He cautions, however, that this approach is based on hypothetical choices, so the research must be carefully crafted to minimise bias in respondents' preferences.

"In the case of human compost pellets, for instance, we are talking about a product that does not exist yet," he says. "People may say they would buy it, but in practice, when the products arrive, they might not".

Jourdain says the next step for human compost market research may be to offer an actual test product at an auction where the real buying behaviour of consumers can be observed.

In the meantime, Jourdain is looking forward to building more skills in choice experiments in South Africa, and watching how young researchers like Dr Gwara successfully use the method in their work.

Higher education and agri-business can uplift SA's poorest households

The poorest of the poor live in KwaZulu-Natal's Zululand and Sisonke districts and the O.R. Tambo district of the Eastern Cape.

Dr Manana Mamabola

New research showed that household incomes have increased in these areas since 2008, and yet between surveys done up to 2017, most people remained extremely poor.

The data also revealed a growing gap between what people earn and what they need to survive.

"It was a bit shocking, honestly, to see what was actually happening within rural districts," says Dr Manana Mamabolo. She made some of these findings as part of her PhD research at UP's Department of Agricultural Economics, Extension and Rural Development.

For example, while the national poverty line increased from R447 to R758 per person per month between 2008 and 2017, individual monthly earnings in Zululand only went from R468 to a meagre R475.80 over the same period.

For context, South Africa's poverty line currently sits at around R1 000 per person per month, according to Stats SA. The minimum amount one needs now just to buy enough food in a month is estimated at R663.

As a citizen and scientist, Mamabolo knew that many South Africans lived below the poverty line. However, she says previous studies generalised nationally or concluded that rural communities are poorer than urban folks.

To get a more granular picture at district level, she delved into household income data surveyed by the National Income Dynamics Study (NIDS) between 2008 and 2017.

"If we want to come up with interventions and target resources to assist or to try to alleviate poverty, we can't just measure it at the national level and leave it at that," she says. "We must go further into the different rural areas and understand the situation."

Mamabolo and her co-authors recommended a policy shift to focus on higher education and added support for agricultural businesses in many of the traditional rural districts she analysed during her PhD research.

"We found that most people in rural areas had primary or secondary education, and that's about it. We know that education is generally important to improve society – not just up to matric level, but beyond."

She says that many of the households surveyed were already engaged in subsistence farming. "Converting that production into a business might also assist in generating additional income to push them over the poverty line."

Mamabolo says we now need a more local picture of what poor South Africans own and how they spend their money on basic needs like food, so the government can better channel resources to districts most in need.

NAS researchers decode genome of king protea

University of Pretoria (UP) researchers are at the forefront of a very special first for South African plant sciences. They have unravelled the precise genetic make-up of the country's national flower, the king protea (Protea cynaroides). It is the first plant unique to South Africa – and the species-rich fynbos biome in particular – to have its entire genome sequenced in-depth.

"The project is also very special because most of the work was done in South Africa, one of the world's most biodiverse countries," says project leader Professor Eshchar Mizrachi of UP's Department of Biochemistry, Genetics and Microbiology and its Forestry and Agricultural Biotechnology Institute (FABI).

Researchers from FABI, the Department of Biochemistry, Genetics and Microbiology (BGM), and UP's Department of Plant and Soil Sciences worked together on the resulting paper published in *The Plant Journal*. They collaborated with plant genome evolution expert Prof Yves van de Peer's research group at Ghent University and the VIB Centre for Plant Systems Biology in Belgium. Prof Van de Peer also holds joint appointments at UP and the Nanjing Agricultural University in China.

Tissue from the "Little Prince" variety of king protea was used in the analysis because it is readily available in nurseries and would make further research easier.

Based on the entire genome sequencing work done, the researchers found that the genome of *Protea cynaroides* contains 12 distinctive chromosomes. It is about 1.18 gigabases (Gb) long, which means it contains more than 1.18 billion "letters" of the DNA alphabet (A,C,T and G) across these 12 chromosomes. In comparison, the human genome is about 3.2 Gb long, while that of *Arabidopsis thaliana*, the first plant ever sequenced, is about 135 Mb, or 0.135 Gb.

PROTEAS HAVE SURVIVED MASS EXTINCTIONS

The information has allowed the researchers to shed light on the evolutionary past of the king protea and other members of the *Protea* genus and larger *Proteaceae* family. They now believe that ancestors of the Proteaceae family developed an identical, duplicate set of their entire genome about 68 million years (MYA) ago. This helped the family as a whole to survive the K-Pg boundary, a mass extinction period around the late Cretaceous period some 66 MYA ago. The extinction event saw 60% of all plant species and 80% of all animals (including non-avian dinosaurs) disappear from Earth.

Prof Tuan Duong

Prof Eshchar Mizrachi

Prof Nigel Barker

Prof Yves van de Peer

This genome duplication event happened before all extant lineages that are part of the larger Proteaceae family diverged some 63 MYA into what is today around 1 600 species, most occurring in the southern hemisphere. The common ancestor of the approximately 100 species of *Protea* found in South Africa and Australia's related macadamia nut trees (such as *Macadamia integrifolia*) and waratah (*Telopea speciosissima*) dates back to when dinosaurs went extinct.

It supports research previously conducted separately by two members of the project team, Prof Van de Peer and Prof Nigel Barker of UP's Department of Plant and Soil Sciences, who is interested in the evolution of the Proteaceae family. They suggested independently that polyploidisation (the condition where cells in an organism have more than one pair of chromosomes) could have helped plants to survive environmental turmoil and similar extinction events.

PROTEA'S CLUSTER ROOTS HELP THEM THRIVE

Proteas survive and thrive in the nutrient-poor soils of the Cape Floristic Region of South Africa, thanks, in part, to their adaptive cluster root system. This allows the plants to take up as many nutrients as possible from the soil. Notably, it helps them to better "mine" for growth-enhancing phosphorous in the soil, which is usually not easily available to most plants.

Most plants take up nutrients with the help of a symbiotic relationship with soil fungi (the so-called arbuscular mycorrhiza symbiosis, or AM symbiosis) growing on their root systems or by forming nodules that contain nitrogen-fixing bacteria (such as is the case for legumes).

The research team's analysis of the king protea's genome proves definitively – and for the first time – that plant species in the Proteaceae family cannot form any symbiotic relationship with soil fungi because they have lost the specific genes involved in this process.

"The loss of these key genes ultimately caused the loss of AM symbiosis," Prof Mizrachi explains. "However, it is still unclear whether this was followed or preceded by the emergence of cluster roots in the Proteaceae family as an alternative way to take up nutrients from the soil."

He sets out the long-term value of continuing fundamental plant biology research.

"If we can learn more about how this function evolved, one day it might be possible to engineer this ability into crops so that they would need less fertiliser to thrive."

THE APPLICATIONS OF THIS RESEARCH MATTER

The two lead authors of *The Plant Journal* paper, Jiyang Chang of the University of Ghent and geneticist Prof Tuan Duong of BGM, say that knowledge about the *Protea cynaroides* genome paves the way for researchers to better understand the molecular mechanisms that underlie various critical ecological adaptations that Proteaceae possess. This includes the ability of the plants to survive fires, their specialised way of acquiring nutrients from the soil through cluster roots and their unique variety of flower styles.

"It can help us understand the variation underlying the immense floral diversity of the Cape Floristic Region, an area known for the huge variety of endemic plants only found there," the two researchers say. "It can empower new research in plant diversification, horticulture and how plants in particular adapt to nutrient-poor soils."

The king protea genome has a relatively stable structure, as there had not been much rearrangement of the genome, and because it diverged very early from most eudicots (a clade of flowering plants with two seed leaves upon germination).

"Therefore, we could use it to study and compare ancient whole genome duplications in other plant species and, for instance, noted it in the genus *Papaver*, of which the opium poppy is a member," Prof Mizrachi says.

Learn more about proteas from this infographic.

From precipitation to aquifer – what happens between?

"People generally like water from dams for drinking and residential use because they see it. But they are literally walking on (ground) water."

Vertical joint in Clarens Formation sandstone.

People talk about the water cycle and learn about it from school. Water is essential because water, together with air, governs the existence and evolution of all species.

Geology is just as important. As someone said, astronomy gave us distance, and geology gave us time.

According to Prof Matthys Dippenaar from the Department of Geology, "As a geologist, I focus on the vadose zone, also known as the unsaturated zone. Below it is the phreatic zone, which is saturated and called aquifers. In the vadose zone, the top part is the soil zone, where plant roots and evapotranspiration dominate the surface-to-ground interaction. It is well researched in soil science and is a fundamental part of the water cycle that determines what water returns to the atmosphere or the ocean, and what water infiltrates into the intermediate vadose zone."

He emphasised that 96% of all fresh, liquid water is underground. "A mere 4% of the 100% of precipitation that reaches the land surface evaporates, transpires, or flows as runoff. People generally like water from dams for drinking and residential use because they see it. But they are literally walking on (ground) water. Surface water is strongly affected by contamination (elevated concentrations), pollution (contamination with adverse effects), and water losses through evaporation. The vadose zone stores water and transmits it to the phreatic zone, and vadose zones and phreatic zones alternate through the Earth's (capital letter because it's the name of our planet) crust to very deep depths. Hydraulic fracturing (fracking) is a drilling method with which you induce fracturing and permeability to inject and store water or to extract gas."

Prof Dippenaar's research focuses on the intermediate vadose zone. "I've been awarded a big grant from the Water Research Commission (WRC; www.wrc.org.za), progressively building up on the complexity and level of detail. We call the intermediate vadose zone the *Black Box of the Water Cycle* because water infiltrates from the surface, and baseflow is seen in the aquifer. It's an in-and-out thumb-suck of what happens to 96% of all that drinkable water, how it is stored, and how it moves."

He further explained that their research teams started building models with translucent perspex in a geotechnical centrifuge that can accelerate more than 1 ton to over 100g's (a 'g' is one-time Earth's gravity, which is 9.81 m2/s; it is housed in the Civil Engineering Lab) to visualise the simplification of natural fractures into the parallel plate model. In truth, fractures have roughness, asperities, infill, and other influences, such as the fracture's persistence and intersections. We went onto rock specimens to verify the actual flow conditions. We are currently busy with field scale tracer tests (injecting something at one point and measuring or seeing the travel time at another point) and characterisation of the rock mass. Here, the rock has the complexity of fracture geometry, and there is more subdivision in properties across the soil rock interface, residual soils that decompose completely from the rock, and saprolite, which is a weathered rock that still retains some mineralogy, textures, and structures. We are moving into the domains of anthropogenic impacts and will have to consider the wide variety of urban and rural contamination.

The University of Pretoria has become known for its research on the intermediate vadose zone. They all publish papers, given that the work is new and of international significance. There is also a LinkedIn group titled *Intermediate Vadose Zone – Black Box of the Water Cycle* so like-minded people can share research and questions. We wrote several reports and books through the WRC, culminating in *The Vadose Zone – From Theory to Practice*. Furthermore, an honours-level module *Fluid Mechanics in Geological Media*, unique to UP, has also been implemented.

There are still hordes of questions to address, but there are increasingly more academics globally committed to working on the intermediate vadose zone. It forms part of the Earth's Critical Zone, incorporating the land surface, vegetation, and water bodies, extending through the soil, vadose, and phreatic zones. We acquired a *Capillary Pressure Mercury System* that uses nitrogen to have mercury imbibe into pore spaces, determining porosity (and possibly permeability) to a pore size of 2.7 nm. This will provide new knowledge as the adhesion (water attracting to the mineral surface) is the critical mechanism where capillary suction overrides gravity, as opposed to cohesion (water molecules attracting to each other). That means that small-scale information is vital.

As research continues, more and more questions are answered. That is why research is important, and incorporating research into teaching is more important.

Matthys and Mampho, both lecturers, were on an excursion with the honours engineering geology and hydrogeology students (2022).

The water table is in the fractured rock of the Msikaba Formation.

Open access:
https://themedicon.com/journals/agricultureenvironmental/MCAES-05-128

Visiting PhD student from France investigates salt usage when cooking chicken

From left: Raphaël Monod, master' students Kyle Hay, Clarissa van Heerden and in front, Dr Zeinab Asadi (postdoctoral fellow).

Salt overconsumption is a worldwide health issue targeted by global health organisations. Reducing table salt use can help prevent cardiovascular diseases like strokes and heart attacks.

The South African government already set mandatory regulations for reducing salt in commercial food to tackle this issue. In this context, Prof Riette de Kock from the Department of Consumer and Food Sciences studied chicken cooked in a bouillon a few years ago in collaboration with researchers from Unilever and North West University. Stock cubes varying in salt content were used, and sensory evaluation was performed. Researching salt reduction strategies in South Africa is vital to prevent costly medical spending.

Earlier this year, Raphaël Monod, a PhD student at the Centre for Taste and Feeding Behaviour (CSGA, Dijon, France), was a visiting researcher at the Department of Consumer and Food Sciences to conduct a sensory evaluation study on salt use when cooking and eating chicken. He is doing his PhD under the supervision of Dr Thierry Thomas Danguin and Dr Sylvie Clerjon.

His research project is on reducing table salt use when cooking and seasoning our dishes. His PhD is part of the broader project Sal&Mieux funded by the French National Research Agency. Raphaël is part of the Agreenium International Research School (EIR A) course programme, which includes scientific experience abroad. He decided to spend this period at the Department of Consumer and Food Sciences at UP with the agreement and the supervision of Prof De Kock.

In France, Raphaël studied the salt perception of carrots and pasta salted with different types of salt and added at different times (during or after cooking). At UP, the influence of flavourings used during cooking on salt perception is under investigation. The food matrix studied was chicken breasts. For this experiment, 150 participants (registered on the UP-Consumer database) came to taste chicken breast meat prepared in nine different ways. More than 60 kg of chicken, 100 L bouillon, and 500 g of salt were necessary.

While busy with his research, Raphaël assisted with practical training and presented a lecture to Food Science and Consumer Science students.

If you are interested in participating in food research. To participate, you can join the UP-Consumer database at bit.ly/UPConsumers

Contact person: Raphaël Monod at raphael.monod@inrae.fr

Dr Thulani Sibanda

Prof Elna Buys

Africa should prepare for deadly listeriosis outbreaks, however rare

Researchers say African public health systems should put measures in place to detect and report listeria infections. Although this serious infection is not a big problem in Africa yet, a review of the evidence suggests conditions in many countries are ripe for an outbreak.

Listeriosis is a food-borne disease that can result in invasive infections such as meningitis and bacteremia. It is caused by a pathogen known as Listeria monocytogenes.

Dr Thulani Sibanda, a food scientist at the UP's Consumer and Food Sciences department, says that the risk of human exposure is high with more Africans consuming processed foods.

He says the typical high-risk foods are ready-to-eat, cold foods consumed without cooking. This includes "viennas", "russians" and other processed sausages and cold meats that are usually stored for long periods. Even with refrigeration, these foods can be risky for the vulnerable.

"There are these kinds of fast foods that people eat a lot of, like polonies and cheese," says Sibanda. "If you know you are probably at risk, those are the foods you should avoid or consume foods served hot."

Sibanda says, "Unfortunately, most African countries are neglecting food-borne challenges, focussing instead on diseases like HIV/AIDS, TB and malaria."

This is a problem since people living with some of these diseases, as well as Africa's growing elderly populations and those with anaemia, are the most vulnerable to severe symptoms and death.

Rapid urbanisation, warmer temperatures due to climate change, and interruptions to the cold chain through electricity shortages are additional threats.

"Public health systems in general need to be alert to this," says Sibanda, adding that consumers need to be educated about the risks. "Our survey shows that even the terms 'listeria' or 'listeriosis' are not commonly known in Africa."

He says African countries should have systems in place for early detection and reporting of listeriosis. They must also look at food safety standards, especially for ready-to-eat foods.

Currently, South Africa is the only African country with the necessary systems in place. "If there is a probable suspected case of listeriosis, South African doctors are obliged to report it to the Department of Health," says Sibanda.

Unfortunately, many cases remain undetected because the symptoms are similar to other infections.

Although listeriosis cases and outbreaks are generally still rare in Africa, Sibanda says we must be better prepared because bacterial foodborne diseases have the highest fatality rates.

Unique approach of UP Natural Hazard Centre to seismic hazards central to its success

The UP Natural Hazard Centre, Africa, developed unique methods and computer codes for natural hazard and risk assessments over the last few years. Not every centre can boast of such achievements.

Prof Andrzej Kijko

"Our approach is unique because, unlike the standard techniques, they allow handling incomplete and uncertain data. (All standard procedures require complete data!). Our methods have become an international standard in the last couple of years, and our computer codes have been applied in more than 80 countries. Perhaps the most significant recognition we got from the nuclear industry," explains Prof Andrzej Kijko, Director of the Centre.

He emphasises this by saying, "Our approach to seismic hazard assessment of nuclear facilities are used in American Nuclear Regulations, as, e.g., *"Central and Eastern United States Seismic Source Characterization for Nuclear Facilities. U.S. Department of Energy 1000 Independence Avenue SW Washington, DC. , U.S. Nuclear Regulatory Commission Office of Nuclear Regulatory Research, Washington DC 20555 NUREG-2115*

"Furthermore, our techniques of seismic hazard assessment for nuclear facilities are recommended by the International Atomic Energy Agency (*IAEA, Safety Reports Series No. 89, 2016*) to be used in the areas of typical intraplate seismicity, such as the New Madrid Zone in the United States, the Vrancea area and in southern and northern Europe. Our methods are used to assess seismic hazards for nuclear sites and nuclear waste repositories in Italy, Israel, Finland, Indonesia, and India. Iranian engineers apply it for seismic hazard assessment of Russian design NPP BUSHEHR (BNPP-2), Iran."

He elaborates further: "The same procedures are applied for hazard assessment of critical structures such as airports, water reservoirs, oil platforms, seaports, electricity grids, and tailing dams in countries like China, Canada, Egypt, Finland, Greece, India, Italy, Iran, Israel, Norway, Spain and Sweden I n 2020, our approach was applied in China, Japan, Iran, Kuwait, Saudi Arabia, Pakistan, Nepal, Algeria, Egypt, Chile, Peru, Spain, Algeria and Vietnam. It was used to compile national seismic hazard maps of countries such as Kuwait, Oman, Saudi Arabia, Nepal, Iraq and Vietnam."

Another feather in the cap of the UP Hazard Centre is that "Our mathematical formalism, used to quantify hazards and risks, is so unique that it is the subject of studies by mathematicians in e.g. Russia and Argentina."

Prof Kijko concludes: "The latest application includes assessing seismic hazards to the Trans Adriatic Pipeline, allowing access to the European market through natural gas reserves in the Caspian Sea. The project has been one of the developments of most interest to the European Union, with a total investment of over €40 billion. The entire pipeline's length is about 880 km, most in Greece (550 km), 215 km in Albania, 105 km offshore in the Adriatic Sea, and about 8 km in Italy.

Global Engagement

Double win for NAS at SA's 'Science Oscars'

Two researchers from UP's Faculty of Natural and Agricultural Sciences (NAS) have emerged as winners of the highly coveted National Science and Technology Forum/South32 Awards, popularly referred to as South Africa's "Science Oscars".

The NSTF-South32 Awards acknowledge exceptional contributions to science, engineering, technology (SET), and innovation, and are supported and endorsed by the Department of Science and Innovation (DSI). The awards are widely recognised as the country's most prestigious and extensive public SET and innovation accolades.

Professor Paxie Wanangwa Chirwa was the recipient of the Management Award for his contribution, centred on people, to future forestry development in South Africa, and for training future foresters to help them recognise the importance of communities in proximity to the forest resource in sustainable forest management and use.

He is the South African Forestry Company Limited (SAFCOL) Forest Chair and Director of the Forest Science postgraduate programme in the Faculty of Natural and Agricultural Sciences at UP. He is a forest scientist and specialises in socio-ecological systems in forests, agroforestry, and social or community forestry. His research group works on various projects in remote regions of South Africa and other forest ecosystems in Africa, including the miombo dry forest and woodlands of southern Africa.

Management Award, Prof Paxie Chirwa (UP), Dr Oupa Nkagisang (South32) and Mr Daan Du Toit (DSI).

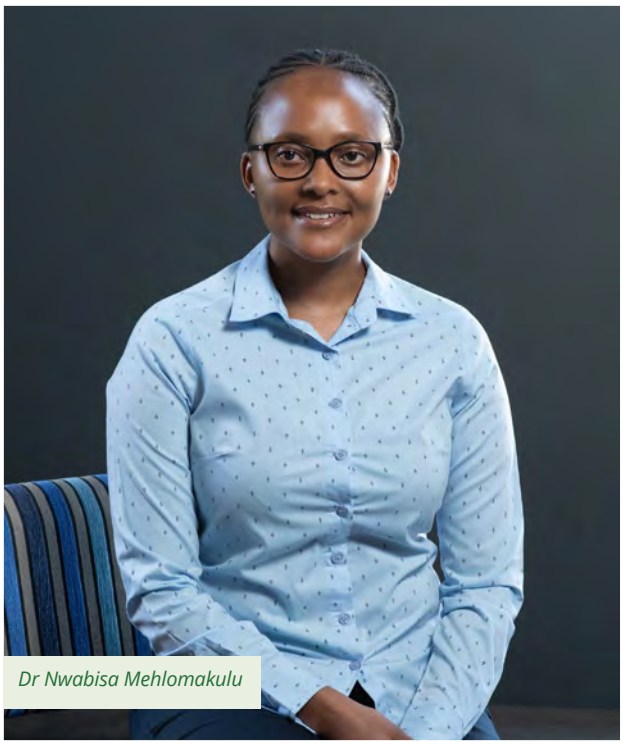
Emerging Researcher Award, Dr Daniel Hart (UP) with Thashree Marimuthu (SAYAS) and Mr Daan Du Toit (DSI).

Dr Daniel William Hart, senior research fellow from the Department of Zoology and Entomology, received the TW Kambule-NSTF Award: Emerging Researcher. This was in recognition of his contributions to utilising concepts from evolutionary biology to address biological questions of health, biological, social and economic relevance to humans. His research focuses on using knowledge of the evolutionary biology of mammals to improve treatments of human medical conditions and to predict future consequences of climate change.

The University of Pretoria proudly celebrates the remarkable achievements of these exceptional individuals who use their scientific contributions to ***make today matter*** and create a better tomorrow.

Dr Nwabisa Mehlomakulu selected as Fulbright Research Scholar

Dr Nwabisa Mehlomakulu, lecturer in the Department of Consumer and Food Sciences, has been selected as a Fulbright Research Scholar for the 2023 – 2024 academic year.



Dr Nwabisa Mehlomakulu

This scholarship programme offers students and staff an opportunity to strengthen the University of Pretoria's (UP) efforts to advance internationalisation and expand endeavours towards engaged scholarship.

Dr Nwabisa Mehlomakulu, a food processing and preservation lecturer, has been selected as a Fulbright Research Scholar for the 2023 – 2024 academic year. This scholarship programme offers students and staff an opportunity to strengthen the University of Pretoria's (UP) efforts to advance internationalisation and expand endeavours towards engaged scholarship.

The US government sponsors this international academic exchange programme and offers academics and professionals lecturing and research opportunities at host institutions in the US. These opportunities foster collaborations and networks with international scholars and Fulbright alumni. Through the programme, scholars can teach and/or do research at the host institution for three to nine months to develop their research niche and expand on their projects, skills and network. Scholars are expected to infuse curricula with cross-cultural perspectives upon their return and facilitate international research and engagement opportunities at their home institutions.

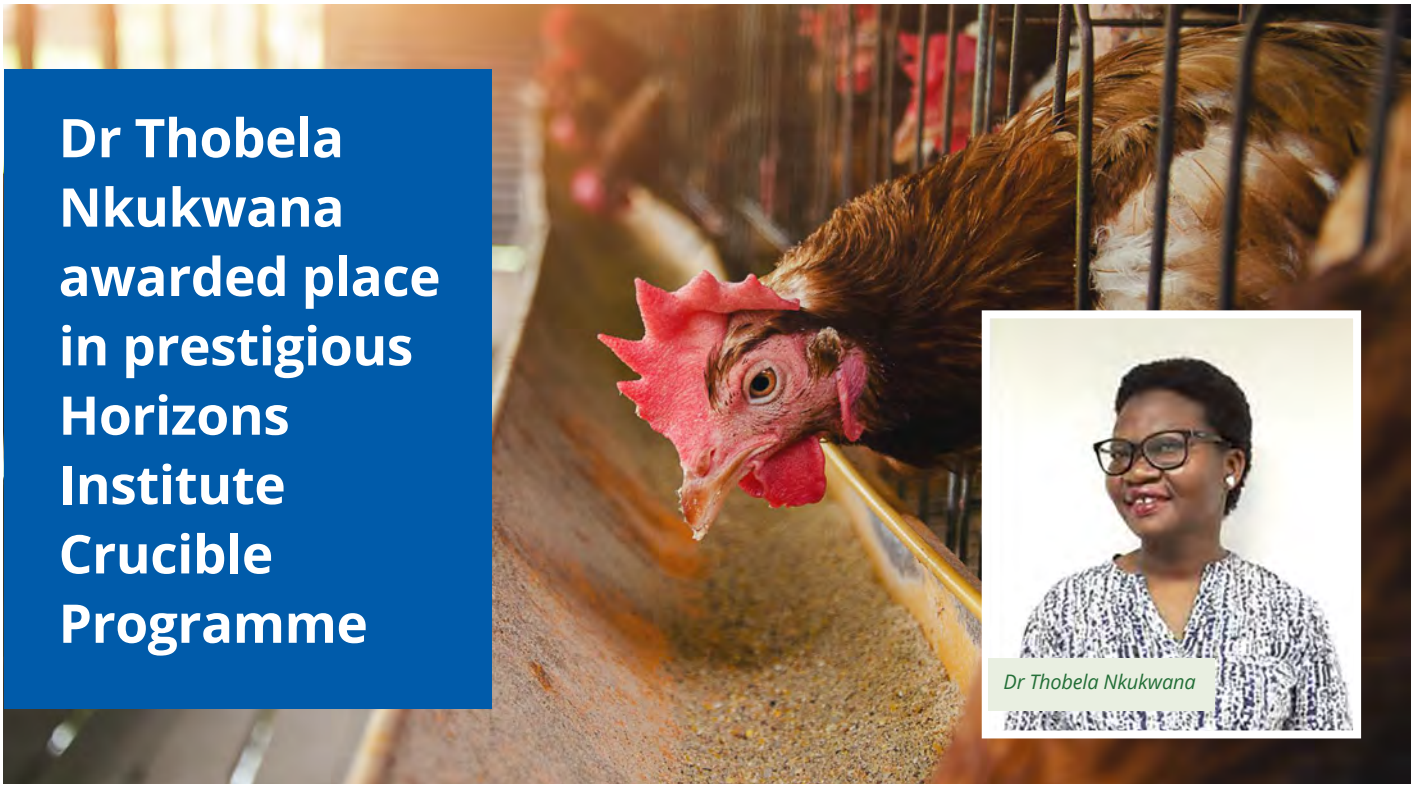
"I am pleased with the selection as it means I have an opportunity to grow my research niche on yeast interactions in fermented foods and beverages by working with an established researcher in the field," Dr Mehlomakulu said. "It also gives me a platform for international collaborations, which will benefit my students and the department."

A Fulbright scholarship adds credit to an individual's résumé in two ways, says Dr Mehlomakulu.

"It shows the researchers' international profile through their collaborative work (publications and research grants) with the host and other international scholars, and it opens up opportunities for postgraduate student co-supervision and exchange."

"The Fulbright Research Scholar Programme is highly prestigious and successful candidates are selected after a rigorous review process," said Prof Gyebi Duodu, Head of the Department of Consumer and Food Sciences. "As a department, we are extremely excited and proud of Dr Mehlomakulu for this excellent achievement. It clearly demonstrates the excellence of her research and the giant strides she is making in her research and academic career. This award will contribute tremendously towards her efforts at establishing a research niche in the department on yeast interactions in fermented foods and beverages. She has our very best wishes!"

Dr Thobela Nkukwana awarded place in prestigious Horizons Institute Crucible Programme



Dr Thobela Nkukwana

Just in time for Women's Month celebrations, two women researchers from the University of Pretoria (UP) – Dr Thobela Nkukwana and Dr Tafadzwa Mushonga – have been awarded places in the prestigious Horizons Institute Crucible Programme for 2023/2024.

The Crucible Programme is presented by the Horizons Institute, based at the University of Leeds. It consists of a series of in-person and online events over six months, which bring together early- and mid-career academics from different disciplines to allow them to expand and strengthen their networks, develop their research ideas together, and apply for funding to further explore these ideas.

Dr Thobela Nkukwana is a senior lecturer in poultry science at the Department of Animal Science at UP. She is an animal scientist trained in commercial agriculture, which has been the primary focus of her research and training of students. Dr Nkukwana is sub-editor for the *South African Journal of Animal Sciences*, an Editorial Board member, sub-editor of the *Welwitschia International Journal of Agricultural Sciences*, and a reviewer for several high-impact journals.

Teaching and research are her passion. Having worked in various private-sector and academic contexts, she has become keenly aware that agricultural interventions cannot be the same for commercial producers and smallholder farmers (particularly in rural communities). Her research interests have thus shifted towards scaling innovation for sustainable livestock production at the level of the community through knowledge sharing and practical application of what can work with locally available resources while creating awareness on the land-water-energy nexus, animal welfare, and biosecurity controls.

Asked about this opportunity to participate in the Crucible Programme, Dr Nkukwana said, "I want my knowledge to have relevant application across different populations. This programme will provide such learning for me, and as a collective, I believe we will do great work. I am invigorated and very excited to be part of this programme. It is a great opportunity for me, and I plan to learn and engage with the team as much as possible towards better outcomes for all involved."

The Horizons Institute emphasises that mutual, reciprocal learning is central to the Crucible Programme. Participants must be open to departing from their usual research methods and transforming their individual approach and broader field through transdisciplinary collaboration. The programme specifically aims to bring together academics who are enthusiastic about developing innovative research by integrating approaches, methodologies, and datasets in innovative and novel ways.

The second Crucible Programme awardee Dr Tafadzwa Mushonga is a research fellow at the UP Centre for the Advancement of Scholarship (CAS) and is currently leading the Environmental Humanities Programme alongside Professor James Ogude.

Prof Lise Korsten - first female president of the African Academy of Sciences

UP's Professor Lise Korsten has hit the ground running as the new and first female African Academy of Sciences president.

The pan-African body, established in 1985 to promote science, technology, and innovation on the African continent, has a new governance line-up headed by Prof Korsten, who won the hotly contested election for the presidential post.

"I must be honest, I did not think I was going to get elected," said Prof Korsten, a Professor in Plant Pathology and Co-Director of the DSI-NRF Centre of Excellence in Food Security. "This very challenging position will require extensive networking, building relations with various stakeholders, and creating new partnerships. To champion change, I will need to, as a priority, realign, re-focus, recharge, and redeploy people and committees, and redesign structures and systems that will take us into a very new, exciting, but different future."

She said she is honoured at being handed such a big responsibility. "It is about the African continent, and it is all about timing. The time is now for Africa to rise, and the opportunities are enormous if we are ready to explore these. The Governing Council will have to accelerate our pace of transformation and adjustment to catch the waves of opportunity; otherwise, Africa will miss the boat

Prof Lise Korsten

and not rise to the occasion. We should not be left behind and should lead the way because the next century will bring significant changes and opportunities. The Academy must grow, invest in, and nurture our youth, particularly our female scientists, because it is our biggest asset."

Her vision for the Academy is to have a strong, dedicated Governing Council that will take it to new heights, build trust and respect within the secretariat, and develop a turnaround strategy. "This is important for me so we can close a difficult chapter, build new partnerships, create new initiatives, and focus on opportunities that will benefit African scientists. We want to increase the number of our Fellows and focus on the diaspora and investors to help create new centres of excellence in Africa. We are clear on our many challenges as an academy and the continent. We will endeavour to prioritise and focus on areas such as health, climate change, water, energy, food security, and the many sociopolitical challenges we have. We will embrace new technologies such as AI that can provide future solutions for our continent, seek peace and prosperity for all our people and work towards the [African Union's] 'Agenda 2063: The Africa We Want'."

The Academy is planning several new sub-committees and exciting projects, such as developing young African scientists, a focus on female academics and women's health, getting more involved with the multinational organisation African Animal Care and Use (ACURET), the African Synchrotron projects, taking part in the African Development Bank climate change initiative Africa Pavilion, and the African Union's small business development platform BOMA. "We also aim to strengthen relations with the African Union, European Union, World Economic Forum, and so on, as well as the International Science Councils, Inter-Academy Partnership, other academies from China, the United States of America, and Europe, as well as African institutions, academies and, most importantly, developing our unique African footprint in science."

Prof Korsten encourages young people to dream the impossible but not make dreams their master. "Find a balance in life and invest in good friendships, love your work, build careers, find good mentors… and become fellows of the African Academy of Science… Seeing the stars in the eyes of young people with dreams and aspirations and, most importantly, a determination to succeed, encourages me to keep working hard."

"This very challenging position will require extensive networking, building relations with various stakeholders, and creating new partnerships. To champion change, I will need to, as a priority, realign, re-focus, recharge, and redeploy people and committees, and redesign structures and systems that will take us into a very new, exciting, but different future."

Prof Fanus Venter elected as new SASSB president

Prof Fanus Venter, Professor in the Department of Biochemistry, Genetics and Microbiology and Deputy Director of the Forestry and Agriculture Biotechnology Institute, has recently been elected as the new President of the Southern African Society for Systematic Biology (SASSB).

According to Prof Venter, "SASSB is a truly remarkable society as it embraces the whole range of disciplines focusing on the taxonomy and evolution of the biodiversity of South Africa, from microbes to large mammals and trees and everything in between. This is best demonstrated by the fact that as the newly elected president, with a research focus on bacteriology, I took over the reins from a botanist. The rest of the SASSB council is just as diverse: botanists, entomologists, mycologists and zoologists. It is, therefore, a privilege to lead this group of scientists as we work together to promote the broad field of systematics in our country," Prof Venter explained.

"During the next 18 months, we want to improve the relevance of SASSB by strengthening our engagement with students. We plan to expand our current webinar series to include a series of talks on the basic principles and applications of phylogenetics, phylogenomics and biogeography aimed at post-graduate students in all fields of biology. These webinars will be presented by senior members of the society from various

Prof Fanus Venter

disciplines to ensure that we transfer the valuable lessons we have learned over the years to the next generation of researchers. In this way, we can ensure the quality and relevance of systematics in Southern Africa. These webinars will also be available on our YouTube as an educational resource."

Prof Venter's research focuses mainly on bacterial evolution, systematics and diversity. He elaborated, "I have been part of a small group of international bacterial systematists involved in establishing the SeqCode, an international code for the nomenclature of prokaryotes based on genome sequences as type material. This new code allows for naming cultured and uncultured Bacteria and Archaea, which has not been possible before. I currently serve as the secretary of its Executive Board. In addition, I serve on the International Committee on Systematics of Prokaryotes and the Board of the Bergey's Manual Trust."

Prof Riëtte de Kock awarded prestigious international award

Prof Riëtte de Kock, a renowned sensory scientist from the Department of Consumer and Food Sciences, was recently awarded the Sensory and Consumer Sciences Achievement Award 2023 by the Institute of Food Technologists (IFT).

"I am very grateful for the recognition, and it motivates me to continue my research journey. It was fantastic to attend the award ceremony in Chicago, USA, and experience the IFT annual event and expo. The event, called IFT FIRST (Food Improved by Research, Science, and Technology), was attended by a few thousand delegates and showcased cutting-edge research and technology solutions," she said on being asked how she feels about winning such a high-profile award.

She continued, "The award is meaningful to me as it makes our research at UP visible to a wider international audience and provides more opportunities for capacity building and research collaboration. I celebrate the award with all the students and research collaborators I have enjoyed working with. I plan to use the award to continue building the Africa Network for Sensory Evaluation Research (ANSWER)."

Prof De Kock's current research focuses on optimising the sensory properties of foods that contribute to the nutrition status and well-being of people in sub-Saharan Africa.

Prof Riëtte de Kock

She is also investigating the interest in and potential of novel modern food products developed using African crops like sorghum, cowpea, and Bambara groundnut in various African and European countries as part of the InnoFoodAfrica project.

She founded and is the chair of the Africa Network for Sensory Evaluation Research (ANSWER) and a past research chair of the European Sensory Network. She became president of the South African Association for Food Science and Technology at the association's biennial congress at the end of August.

Gizelle van Niekerk awarded Presidential Portuguese medal

Gizelle van Niekerk, a cum laude graduate in MSc Chemistry, was recently awarded the Presidential medal for outstanding academic achievement by the President of Portugal. This factors in both undergraduate and postgraduate studies at UP.

"It is a great honour and privilege to have received the Presidential Medal. It is wonderful to know that the quality of the education at UP generates students whose achievements are recognised nationally and internationally. I am extremely grateful for this award, as it is a testament to endless hours in the laboratory and countless late nights studying fervently throughout my studies," said an elated Gizelle when asked how she feels about this award.

"She added, "Perseverance and dedication are crucial to success, and these awards reinforce my belief that hard work does pay off. Being acknowledged for one's achievements, especially as a woman in STEM, encourages one to go from strength to strength and is vital in motivating the next generation of female scientists to reach new heights. I am incredibly grateful to my supervisor, Prof Henrietta Langmi from the Department of Chemistry, for her faith in me and all her support. Without her and all the people who have helped me along my journey at UP, I would not be where I am."

Gizelle van Niekerk

Due to the President of Portugal, Marcelo Rebelo de Sousa, visiting the country of South Africa in 2023, South Africa was tasked with identifying top academic candidates among the South African Portuguese community. Nominees were put through a selection process, and the top 10 finalists were invited to meet the President at a Gala Luncheon, during which the medal was awarded to her by the President. Gizelle was awarded the medal based on her consistent top academic achievement and contribution to science in South Africa.

Gizelle also recently learned she is a finalist for the Department of Science and Innovation's Woman in Science Master's Fellowship Awards. She will attend the Gala evening in September, where the award will be conferred.

She presented her MSc research internationally in 2022 at the 14th Green Chemistry Postgraduate Summer School in Venice, Italy. The GSSD (Green Sciences for Sustainable Development Foundation - Europe) and the OPCW (Organisation for the Prohibition of Chemical Weapons – United States) fully funded the trip. Gizelle has already published one article with her supervisor in the *Polyhedron Journal*.

Gizelle obtained a BSc honours in Chemistry with distinction (81.85%) and won the BRUKER Prize for being the top BSc Hons Physical Chemistry graduate. She also graduated top of her class for her BSc Environmental Science degree.

Her master's research was to valorise waste eggshells into a value-added calcium-based metal-organic framework via an acid-mediated green synthesis for potential applications in carbon dioxide capture.

Zeenat Patel

Zeenat Patel selected as recipient of 2023 Abe Bailey Travel Bursary

University of Pretoria (UP) student Zeenat Patel, who is doing a master's in environmental management in the Faculty of Natural and Agricultural Sciences, has been selected as a recipient of the 2023 Abe Bailey Travel Bursary. The selection was made based on her exceptional leadership qualities and community service.

The Abe Bailey Travel Bursary allows university students and junior academic staff to visit the UK. It aims to cultivate future global leaders and supports excellent South African students who demonstrate outstanding leadership qualities and a strong sense of responsibility in developing a robust capacity for interaction with international peers from diverse linguistic and cultural backgrounds. This year's group comprises 16 students from various South African universities.

"I am passionate about community service, and I have held various leadership roles on the Students Representative Council and in my Faculty house (Chair of NATHouse), among others," Patel says. "The Abe Bailey Travel Bursary is an opportunity to make my voice heard and is a platform to challenge myself in an international setting."

Many applications for the bursary were received, and a thorough selection process was conducted. This included in-person interviews with the selection committee, which consisted of the University's registrar, Professor Caroline Nicholson; the Deputy Vice-Principal for Research, Innovation and Postgraduate Studies, Prof Sunil Maharaj; deputy deans, and the deans of students and residences. The selection committee then recommended three students for additional evaluation by Abe Bailey trustees, who awarded Patel the bursary for her outstanding leadership abilities and volunteerism.

"Zeenat is a dynamic, forward-thinking young leader who appears well-positioned to take advantage of every opportunity to improve and broaden her experience. Furthermore, she is committed to enhancing the quality of life for others and making a positive difference," said the selection committee.

They noted that she had balanced her demanding leadership role with her academic programme, ensuring that she remained focused on completing her degree within the minimum time.

"This careful balance is a skill that I started developing at undergraduate level, which I completed with an average of 84%," Patel says. "I then completed my BSc (Hons) in Geography and Environmental Sciences with distinction."

The tour will commence on 28 November 2023 in Cape Town, where the group will spend a few days together before departing for London on 2 December.

Experience new frontiers in Microbiology

AgriMicrobiome Research Group Leader Dr Jarishma Gokul, Ms Degracious Kgoale (PhD candidate) and Ms Mégan van der Merwe (MSc candidate), all from the Department of Plant and Soil Sciences (DePSS) recently had the opportunity to attend the 2023 Microbiology Society's Annual Conference, a flagship event in the Birmingham International Convention Centre, UK. It is designed to create new opportunities for networking and collaboration while disseminating recent advancements in various fields in microbiology.

Dr Jarishma Gokul

Ms Degracious Kgoale

Ms Mégan van der Merwe

The "Hot Topic" lecture by Prof Adrian Hill at the University of Oxford, highlighted the significant impact of a newly developed and highly effective malaria vaccine that has been applied in clinical trials in the UK and Africa. Several talks relevant to the UP delegation were the focus of the "Microbiology Meets Machine Learning" sessions, where researchers from Belgium, Finland, England, China, and the USA, each unveiled the application of machine learning in microbial genomics, including dimensionality reduction and hierarchy, genomic sensing technology for antimicrobial resistance (AMR) surveillance, oxygen adaptation in bacteria, computational learning to identify and prioritise zoonotic viruses using genomic signatures, as well as the inference of host potential from viral genomes.

As part of the "Environmental and Applied Microbiology Forum", **Dr Gokul** presented a flash talk on *Microbial community responses to alterations in historical fire regimes in montane grasslands*, a collaborative effort from herself, Prof Nigel Barker (UP), Dr Gwynneth Matcher (NRF-SAIAB), Dr Joanna Dames (Rhodes University) and Dr Paul Gordijn (NRF-SAEON).

A key aspect of attending the Microbiology Society Conference was networking with fellow professionals and establishing valuable connections and collaborations. The event offered a vibrant environment where the team could engage in stimulating discussions, exchange ideas, and explore potential partnerships. **Ms Kgoale** said, "The fulfilment of being united as microbiologists and being able to communicate in the same language of microbes, while being able to still feel the fascination of how all projects can interconnect and unite in one language of science, contributes to a global microbiology society." **Ms Van Der Merwe** expressed that "this transformative journey offered me exposure to cutting-edge research, as well as knowledge exchange and scientific growth that I may never have had to opportunity to experience." She also won a Microbiology Society prize in the events quiz competition draw.

Building upon the goals of the conference, Dr Gokul additionally met with researchers at the Royal Veterinary College (RVC), London and Aberystwyth University (AU), Wales, to develop partnerships for future research in the areas of microbiomes and One Health, to foster interdisciplinary exchanges. Dr Melanie Hay, a postdoctoral researcher in the UKRI GCRF One Health Poultry Hub (RVC), discussed enhancing the UP programme through a potential collaboration on the use of metagenomics in tracing pathogens and antimicrobial resistance. Dr Gokul's seminar on the *Application of microbiomes in Southern African food systems* at the Department of Life Sciences, AU, sparked discussions on innovative research approaches through metabolomics in food security with Prof Luis Mur, a leader in plant pathology and One Health in the UK. Ms Van Der Merwe and Ms Kgoale were pleased to briefly showcase some of their research in this session, and the AgriMicrobiome team was lauded for their diverse and thought-provoking research.

Dr Gokul stated that one of the main highlights of this research trip was the "emphasis on cross-disciplinary collaboration, which resulted in innovative discussions, shared perspectives, and the potential for ground-breaking solutions to complex microbiological problems in the South African perspective. It exemplified the spirit of scientific progress and underlined the importance of cooperation in advancing our understanding of the microbial world. Attending the Microbiology Society Conference 2023 was an enriching experience, leaving me and my students inspired, motivated, and equipped with a renewed sense of purpose in our scientific pursuits. The event undoubtedly contributed to the continued growth and innovation in microbiology, setting the stage for even greater achievements in the years to come."

Enhanced Access and Successful Student Learning

NAS proudly hosted Prof Makhalanyane's inaugural address

Professor Thulani Makhalanyane, Department of Science and Innovation/ National Research Foundation South African Research Chair in Marine Microbiomics in the Department of Biochemistry, Genetics and Microbiology delivered his inaugural address in August. It was an in-person event.

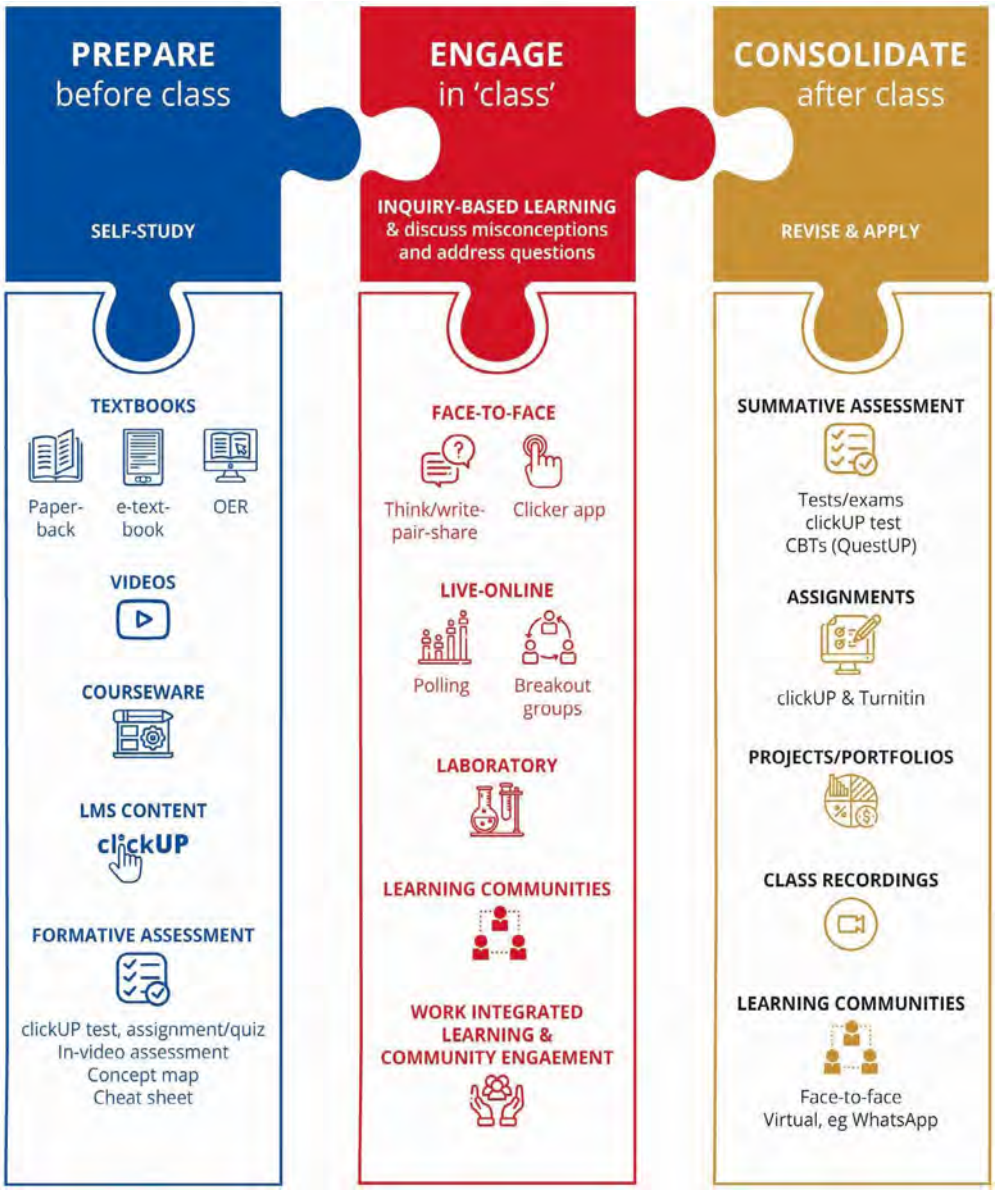
The title of his address was **Exploring the invisible: How unravelling microbiomes is key to a sustainable future.**

From left: Prof Barend Erasmus (Dean: Faculty of Natural and Agricultural Sciences), Prof Thulani Makhalanyane, Prof Themba Mosia (UP Interim Vice-Chancellor and Principal) and Prof Sanushka Naidoo (Head: Department of Biochemistry, Genetics and Microbiology).

Teach and learn the UP Way

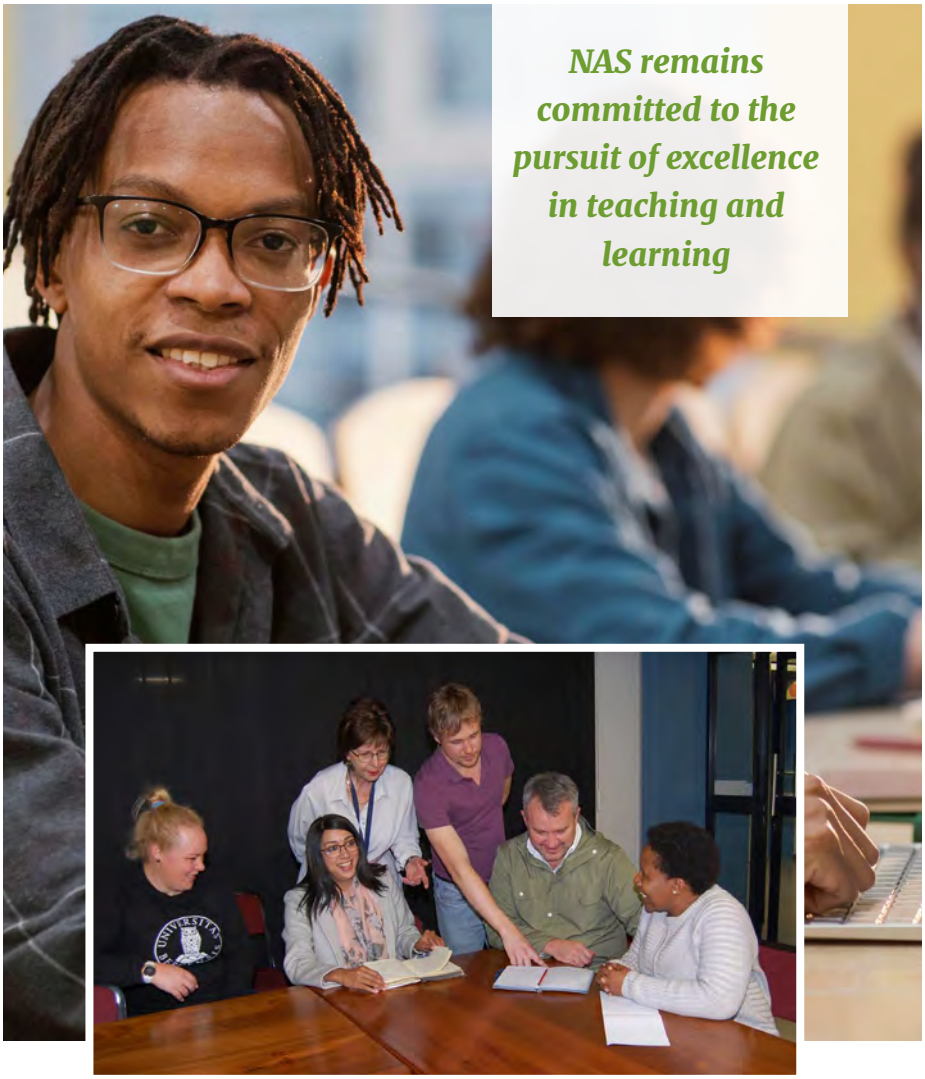
The University's approach to learning theory posits that students actively construct their own knowledge and understandings, which is best achieved through engagement in class using inquiry-based teaching.

A flipped teaching approach, requiring students to prepare before class, allows for new teaching to actively build upon existing knowledge. This creates more time in class for inquiry-based activities, such as developing ideas, exploring consequences, justifying solutions, discussions, and problem-solving, while lecturers can focus on complex concepts and problems. The inquiry-based flip approach is applicable across different instructional modalities.



UPstarters – the academic home for emerging scholars

UPstarters, an innovative way to grow our timber and improve teaching skills, has grown in leaps and bounds and continues empowering teaching staff in the Faculty of Natural and Agricultural Sciences (NAS).



NAS remains committed to the pursuit of excellence in teaching and learning

The UPstarters, initiated by Prof Paulette Bloomer, NAS Deputy Dean for Teaching and Learning, consists of early career teaching staff with less teaching experience. This initiative was based on acting as a community of practice per the suggestions in the National Framework for Enhancing Academics as University Teachers from the Department of Higher Education and Training (DHET). The group is identified as emerging scholars in the Framework and was started in August 2020 when COVID-19 was real and the "new normal" was online teaching.

They meet monthly, and a needs analysis was first on the to-do list after the first meeting in 2020. Dr Ina Louw, the coordinator, presented the survey results soon after the first meeting, and the way forward was planned. She hosted a presentation on 'Active learning', and they also attended a cultural workshop in the next month.

During 2021 and 2022, Dr Louw continued coordinating the UPstarters and identified topics addressed by invited speakers. Discussions were held on how to incorporate the SDGs in the curriculum, balancing teaching and research, attracting funding, and navigating your own personality with those of others. Further discussions were held on time management, career development, inquiry-based learning, and postgraduate supervision.

By the end of 2022, Prof Bloomer decided to empower the UP starters members and give them more responsibilities for their group. An executive committee was formed to represent each cluster, which are Brian Nxala (Geography, Geoinformatics and Meteorology), Robert Mangani (Plant and Soil Sciences), Renate Thiede (Statistics) and Rimbi Shangange (Animal Science). They are coordinating events, and clusters take turns to host the event. The idea is to introduce a topic and allow the group to discuss it.

The topics they have selected so far in 2023 were quite exciting. Discussions about collaborating nationally in postgraduate supervision, experiential learning in a department, and games and simulations to motivate students went well. They also had a lively conversation about Chat GPT.

"The suggestion was made to find mentors to support the group and individuals, and the mentors were again chosen to represent the clusters. We have Dr Pam de Waal, who has been in the group since 2021, but we have added Dr Nadine Sonnenberg, Dr Eder Kikianty, Mr Lindo Magagula, and Prof Nerhene Davis," said Dr Louw.

The idea is not to have only NAS colleagues in the group; we welcome everybody who feels they can and want to improve their teaching and join a community of practice with like-minded academics.

Future scientists awarded as exceptional achievers

More than 60 prizes were awarded at the Annual Exceptional Achievers Function for the Faculty of Natural and Agricultural Sciences students in June this year.

Dr Sibongiseni Mgolozeli from the Department of Plant and Soil Sciences, was the programme director and Dr Seite Makgai from the Department of Statistics, was the guest speaker.

Thys Steynberg, who completed his BSc degree in Physics, received the Vice-Chancellor and Principal's medal for maintaining a weighted average performance (93.34%) during his three years of undergraduate studies. He also obtained first place on the Dean's List for the third-year students. Thys also pulled this achievement off in 2022, when he was the best second-year student on the Dean's List.

Lethabo Mpshe was not only first on the Dean's List in the BSc Extended Programmes with 83,55% but also won the ECP's Exceptional Achievers Award for the best male first-year student in the BSc Extended Programme. Zerwick Johannes de Lange (BSc Physics) was first on the Dean's List in the first-year category with 95,92%. In the second-year student category, Neale Berkenbosch (BSc Chemistry) earned the top spot with 95,70% and walked away with the Department of Chemistry Prize for the best second-year student in Chemistry. Mart-Marié Kotzé was the best student in the category for fourth-year students with 81,80% and also shared the SASCP Prize for the best final-year student in Plant Production and Soil Science with Gideon du Plessis.

Watch the virtual event here.

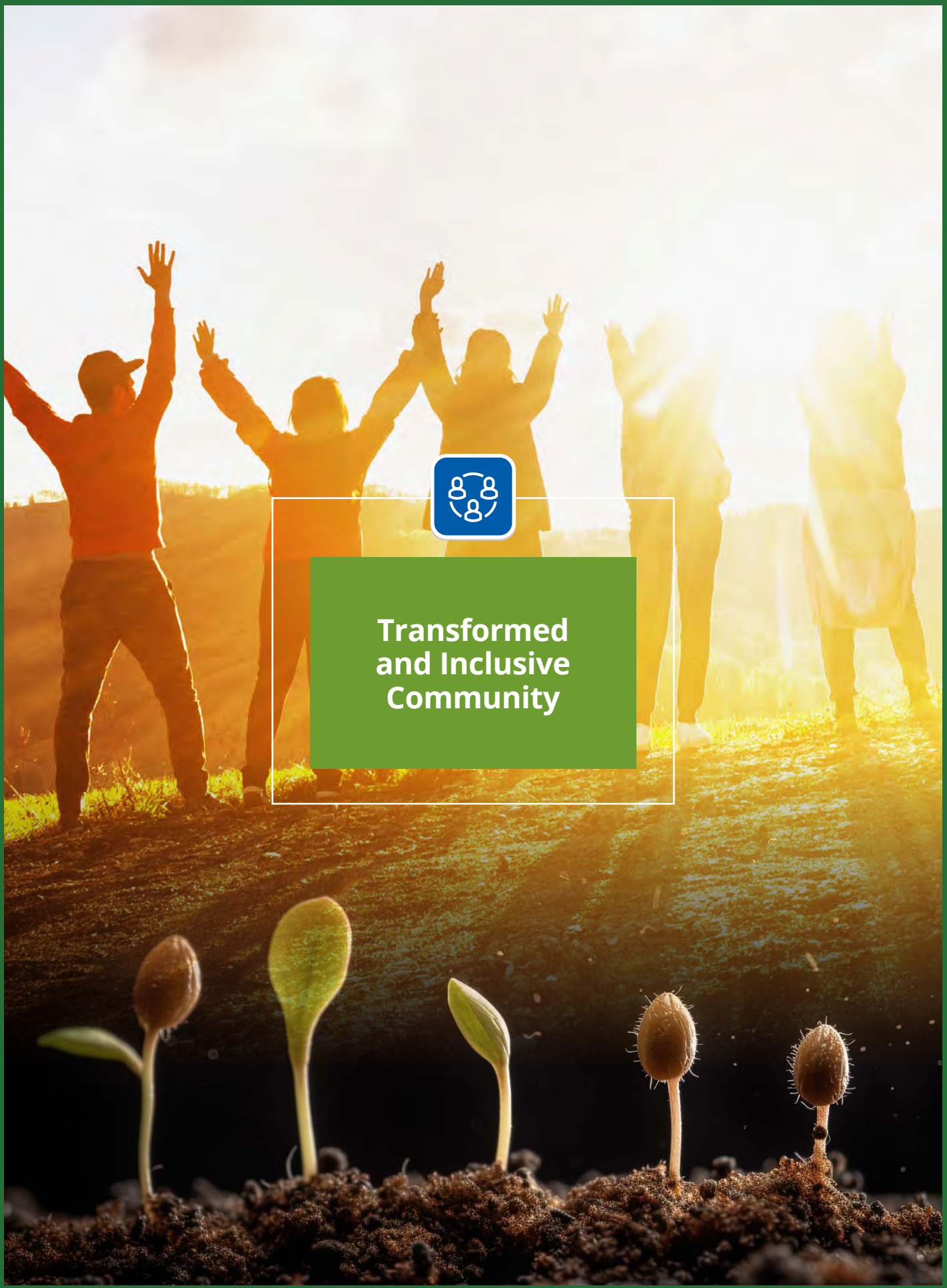
Thys Steynberg and Prof Barend Erasmus, Dean of the Faculty of Natural and Agricultural Sciences

Lethabo Mpshe

Mart-Marie Kotzé

Zerwick Johannes de Lange

Neale Berkenbosch



Transformed and Inclusive Community

CELEBRATING WOMEN OF NAS

The Faculty of Natural and Agricultural Sciences is home to many women, ranging from academic, management and professional staff, performing their daily jobs and excelling in their careers. We focused on a few female staff members during August, Women's Month in South Africa and also celebrated Women's Day on 9 August.

Prof Sanushka Naidoo

Prof Sanushka Naidoo

Head of the Department, Biochemistry, Genetics and Microbiology

Q What has been the highlight of your career?

Giving a TED talk at the world-famous CERN Centre for Nuclear Research, Geneva, Switzerland, on "The elephant in the room: Will we destroy or recreate ourselves?" I spoke about the role of biotechnology in our future preservation.

Q What inspires you?

Fellow women scientists inspire me, and I had the good fortune of having several great role models throughout my career in our Department. More recently, Jennifer Doudna, the scientist who discovered CRISPR technology, is quite an inspiration. Her journey to making this scientific breakthrough is quite fascinating. Another person who influenced me is Kenyan scientist Wangari Muta Maathai, the first African woman to win a Nobel Peace Prize for her efforts to combat deforestation. Such passionate women who persevere and commit to improving lives genuinely inspire me.

Q What challenges have you experienced in your career?

Initially in my career, it was challenging to accept the place of a young South African woman on a world stage; however, as my career progressed, and with more exposure to such opportunities, I have become confident of our place among the world's best scientists".

Q What message do you have for the youth of South Africa?

The youth hold tremendous potential to change society for the better. Recognising and unlocking your talent is critical. Align yourself with the best mentors who support and inspire you to become an inspiration yourself.

"Every action you take is a vote for the type of person you wish to become"

James Clear

Ms Lorelle September

Ms Lorelle September

First Technical Assistant in the Department of Mathematics and Applied Mathematics

Q What has been the highlight of your career?

Working amongst the beautiful minds of mathematicians. According to the QS rankings, UP's Department of Mathematics and Applied Mathematics is now the top Mathematics department in SA.

Q What inspires you?

Comedy can be found almost everywhere, in people and their stories. Laughter is the best medicine.

Q What challenges have you experienced in your career?

The switch to online postgraduate and research support has had its challenges, but discovering innovative solutions has also been interesting.

Q What message do you have for the youth of South Africa?

Every action you take is a vote for the type of person you wish to become - a quote by James Clear.

Prof Paulette Bloomer

Prof Paulette Bloomer

Deputy Dean of Teaching and Learning

Q What has been the highlight of your career?

It is challenging to select only one. Since my first attendance of a graduation ceremony as a member of the academic procession in the AULA many years ago, the graduation and accomplishments of the PG students I have mentored and the students I lectured have become annual highlights. It isn't easy to describe pride when introducing a PhD candidate at the ceremony. Celebrating the 21st birthday of my research group, the Molecular Ecology and Evolution Programme, in 2019 was a research highlight. Serving the Faculty and UP as head of an academic department for ten years and currently as deputy dean has been rewarding.

Q What inspires you?

Faith, the Christian and strong family values my parents instilled, my husband (who is also my best friend), time in nature away from city life, and having an inbuilt desire to contribute.

Q What challenges have you experienced in your career?

It is challenging moving through the academic ranks; I felt I had to prove myself many times. I suffered from burnout in 2011 and never thought it could happen to me. It taught me how important it is not to lose balance and to not be afraid to seek help.

Q What message do you have for the youth of South Africa?

Find your passion, work hard to achieve your goals and never give up. Once, on a flight to Cape Town, there were quiz questions on the monitors – the question was, if you lived to the age of 75, what activity in your life would you spend 23 years on? I cannot remember all the options, but the answer was sleep. This made an impression on me because I love sleep, and neuroscience has revealed how important sleep is for maintaining good health. But this made me wonder if I slept for 23 years, how much time do I spend on other activities? So, I did a rough calculation and realised that one spends almost a similar number of years working. The moral of the story is that it is imperative to discover the best career path or paths for yourself, as this will translate into being truly fulfilled and happy for many years of your life while at the same time making a meaningful contribution to society.

Ms Shado Mahlangu

Ms Shado Mahlangu

Human Resource Officer

Q What has been the highlight of your career?

Managing to recruit and hire the most compatible and qualified staff for the Department, both academics and professional staff members.

Q What inspires you?

Seeing the staff and students of the departments I work with happy, having a conducive working environment, and being paid regularly for their work.

Q What challenges have you experienced in your career?

Being unable to make some final decisions to complete some tasks on time.

Q What message do you have for the youth of South Africa?

They must give their best and be confident in everything they do.

Prof Esté van Marle-Köster

Prof Esté van Marle-Köster

Head of the Department of Animal Science

Q What has been the highlight of your career?

I don't want to single out one highlight, but the most exciting time of my career was when I started my PhD research - I came from the industry. I found the academic environment stimulating. Still happy and in the right space!

Q What inspires you?

I get inspired by going for a long walk, preferably on the beach, watching the rain, reading, and travelling. All of this is likely linked to a positive environment - if you have a positive outlook on life, you will find inspiration in most places.

Q What challenges have you experienced in your career?

The switch to online postgraduate and research support has had its challenges, A Animal Science was a male-dominated career when I graduated - I was one of two females in my class of 1986. I was only the third female Animal Scientist in South Africa to obtain a PhD degree - the challenge was to work harder. but discovering innovative solutions has also been interesting.

Q What message do you have for the youth of South Africa?

Have a positive attitude and resilience - seize the opportunities!

Prof Mmantsae Diale

Prof Mmantsae Diale

Professor in the Department of Physics

Q What has been the highlight of your career?

The highlight of my career was the National Science and Technology Forum recognition that awarded me the Engineering Research Capacity Development award by an individual in 5 to 10 years. I founded the Women in Physics in South Africa with colleagues and represented the country at the international conferences on women in physics (ICWIP) for five conferences. I have also chaired the Black Science-technology-engineering (BSTEP) association, where we addressed the injustices of the past by helping to place in-training students from technikons in companies like Toyota, BMW, Mintek, CSIR and the South African Navy. The students graduated after the experiential training they lacked to finalise their degrees. The many international collaborations have significantly impacted my career and helped me focus on science.

Q What inspires you?

I am inspired by the success I add to others. I am passionate about teaching with excellent results. In my years of teaching, I have always attained an almost 100% pass rate on all levels I taught, from high school to university. My students have become valuable citizens in their respective careers. I am good to identify talent and mentoring people on their career path.

Q What challenges have you experienced in your career?

My main challenge has been dealing with men in my male-dominated field. Men dominate physics; that is why women in Physics is a unique project addressing women's issues in physics. In some cases, I had to report to higher authorities to address the issues I found professionally draining due to males who are all out to pull one down. The next challenge is attracting funding for research.

Q What message do you have for the youth of South Africa?

In all your endeavours, focus on a goal, and you will be successful. Do not lie about your credentials and achievements. Work hard, and you will make it.

Women who inspire

Prof Serena Coetzee

Prof Serena Coetzee

Head of the Department of Geography, Geoinformatics and Meteorology

Q What has been the highlight of your career?

Too many to choose one that stands out. I make sure that there is something, however small, to celebrate at the end of each year.

Q What inspires you?

Making a difference in the lives of other people and thereby making the world a better place.

Q What challenges have you experienced in your career?

Many! But I like to see them as opportunities ;-)

Q What message do you have for the youth of South Africa?

Hang in there. If each of you gives your best, then the future will be a better place than today.

Making a difference matters

Ms Vusani Mathada

Ms Vusani Mathada

Museum Curator of the LC de Villiers Geology Museum in the Department of Geology

Q What has been the highlight of your career?

Working with young minds, be it school visits or first-year students during practical sessions. Once we go through the fundamentals of physical sciences, the myths about human evolution, the Big Bang or other planets become jokes that make everyone want to learn more about Geology and all the sciences linked to it.

Q What inspires you?

Wanting to see Africa in control of its future gives one a sense of purpose as I am part of this change in my everyday life.

Q What challenges have you experienced in your career?

To take time to look after your inner being, one must always take time to rest. It is impossible to do everything - seek support and have people you can rely on in your life.

Q What message do you have for the youth of South Africa?

Your life is precious - your future is as good as the change you want to see. Be actively involved in bringing change wherever you are. What you do today will impact your children's future and the community at large.

Mrs Leushantha Mudaly

Mrs Leushantha Mudaly

Lecturer in Soil Science in the Department of Plant and Soil Sciences

What has been the highlight of your career?

There have been a few, but two that stick out. One was when a student called me a few years after his honours degree to tell me he was employed and doing well. He wanted to thank me for contacting him when he dropped out of the honours programme and motivating him to continue and complete his studies. Knowing you played a small part in someone's success makes this job much more fulfilling. The second was winning an award for the best paper (by an author 30 or younger) in the Soil Science category at the National Combined Congress (George, Western Cape, 2015).

What inspires you?

My parents have been the most significant source of inspiration. My parents come from impoverished backgrounds and could not study further than Grade 12. However, their hard work and sacrifices ensured I could be the first in our family to obtain a degree from a tertiary institution.

What challenges have you experienced in your career?

As an Indian South African, studying Soil Science was not an obvious choice. There were also challenges associated with being a Soil Scientist of colour. However, the positive experiences far outweigh the negative. More recently, as a toddler's mother, it is challenging to strike the perfect work-home balance, particularly during the COVID-19 pandemic.

What message do you have for the youth of South Africa?

I advise you to always believe in yourself and seize opportunities. I have learned that we can do much more than we can imagine, and hard work is the key. Of course, there will always be setbacks, and some may discourage you, but if you have a passion for what you do, go for it, and success will follow.

Prof Nerhene Davis

Prof Nerhene Davis

Associate Professor in the Department of Geography, Geoinformatics and Meteorology

What has been the highlight of your career?

In 2017, I got the opportunity to join a small group of postgraduate UP students to participate in a BRICS summer school exchange programme between UP and the URAL Federal University in Russia. The programme concluded with a culture evening where we had to showcase the diversity of South African culture. During this exchange, I presented a lecture on Urban Development trends in BRICS countries at the URAL Federal University, experienced a bit of Russian culture and acted as an ambassador for SA.

What inspires you?

Working collaboratively with people/colleagues inspires me. I learn from others during collaborative encounters and find that these interactions inspire me to improve my skills and creativity. Collaboration, therefore, becomes a catalyst for me to think differently about how I would approach a task or problem, and it also helps me to become more creative and critical about the nature of the contribution that I can make in different contexts.

What challenges have you experienced in your career?

I think of myself as a "late bloomer" in terms of my academic career. I had three boys in fairly quick succession during the first few years of marriage, and like most new moms, I lost a bit of momentum in my career path. Losing momentum triggered self-doubt about my abilities as a researcher, mom and lecturer. It took a lot of courage for me to start and complete a PhD at a more advanced age in my life, and I needed to catch up with my peers. I needed to redefine the balance between my roles as a mother and an academic to improve my career progress, which was challenging.

What message do you have for the youth of South Africa?

The youth of SA should constantly be reminded that their decisions today will influence the quality of their tomorrow. They should be told that their subject choices, the spaces they choose to occupy or disregard, and their life choices will determine their future career trajectories. Therefore, we should use every opportunity to encourage the youth of SA to make good life choices and sound decisions by reminding them to always consider the outcomes of their decisions in the long term.

FEMALE STAFF IN NAS

DEPARTMENT	ACADEMIC STAFF	PROFESSIONAL STAFF	TOTAL STAFF
Actuarial Science	1	2	3
Agricultural Economics, Extension and Rural Development	2	5	7
Animal Science	6	14	20
Biochemistry, Genetics and Microbiology	26	37	63
Chemistry	17	11	28
Consumer and Food Sciences	16	12	28
Geography, Geoinformatics and Meteorology	10	5	15
Geology	4	5	9
Laboratory for Microscopy and Micro- Array		2	2
Mammal Research Institute	2	2	4
Mathematics and Applied Mathematics	11	7	18
NAS Dean's Office	1	27	28
Physics	4	1	5
Plant and Soil Sciences	12	17	29
Sci-Enza Science Centre		6	6
Statistics	17	6	23
Zoology and Entomology	2	10	12
TOTAL:	**131**	**169**	**300**

44% Female academic staff

56% Female support staff

Biochemistry, Genetics and Microbiology – most female staff members: **63**
(21% of NAS female staff)

RETHINK@NAS, the Faculty's transformation initiative, want to make Women's Day/Month more inclusive at NAS and requests your input on how to do that. Please complete the form in the link and share your thoughts on how we can do it at NAS.

https://forms.gle/bvGNcCs2enDNqRx96

Watch out for the first edition of the RETHINK@NAS newsletter in September 2023!

NAS PART OF AN INITIATIVE TO PUT GBV ICON ON UP APP

#RETHINK@NAS, in collaboration with the Student Counseling Unit (SCU) and the UP Transformation Office, and with the help of Information Technology Services, have completed a project to include a Gender Based Violence (GBV) icon on the UP mobile app. The icon aims to put information about GBV matters in a student's hand. This includes SCU contact details, information about GBV training and access to the Anti-discrimination reporting system.

@RETHINK@NAS is the Faculty of Natural and Agricultural Sciences (NAS)'s transformation initiative.

NAS DEEL VAN PROJEK OM GBG IKOON OP UP TOEP TE PLAAS

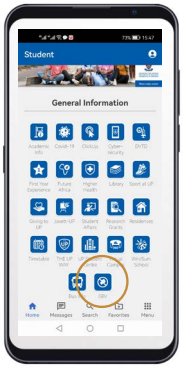
#RETHINK@NAS, in samewerking met die Studente-beradingsentrum (SBS) en die UP Transformasiekantoor, en met die hulp van Inligtingstegnologiedienste, het 'n projek voltooi wat 'n Geslagsgebaseerde Geweld (GBG)-ikoon op die UP mobiele toep plaas. Die ikoon is daarop gemik om inligting oor GBG-aangeleenthede in 'n student se hand te plaas. Dit sluit SBS-kontakbesonderhede, inligting oor GBG-opleiding, en toegang tot die teendiskriminasieverslagstelsel in.

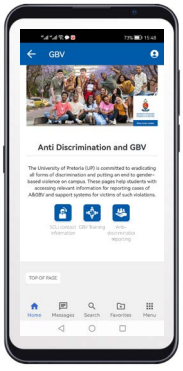
@RETHINK@NAS is 'n transformasie-inisiatief van die Fakulteit Natuur- en Landbouwetenskappe (NAS).

NAS KE KAROLO YA LENANEO LA GO BEA AEKHONE YA GBV MO EPONG YA UP

#RETHINK@NAS, ka tirišano le Lekala la Thobamatswalo ya Baithuti (SCU) le Ofisi ya Phetogo ya UP, gape ka thušo ya Ditirelo tša Theknolotši ya Tshedimošo, ba phethile protšeke ya go akaretša aekhono ya Dikgaruru tšeo di Theilwego go Bong (GBV) mo epong ya go thetha ya UP. Aekhone e nepile go tsenya tshedimošo ya ditaba tša GBV ka diatleng tša baihuti. Se se akaretša tshedimošo ya kgokagano ya SCU, tshedimošo ya tlhahlo ya GBV le phihlelo ya lenaneo la go bega kgahlanong le Kgethologanyo.

#RETHINK@NAS ke lenaneo la phetogo la Lefapha la Disaense tša Tlhago le Temo (NAS).





The icon aims to put information about GBV matters in a student's hand.

Free NAS little library celebrates Mandela Day

In celebration of Mandela Month 2023, the Office of the Dean of the Faculty of Natural and Agricultural Sciences (NAS) initiated the establishment of a free mini-library in the Agricultural Sciences Building's Foyer. This is an ongoing project.

The aim is to create a vibrant space in the Faculty foyer filled with books that inspire, educate, and entertain. By donating your previously loved books to the free mini library, everyone contributed to fostering a culture of reading and knowledge sharing among our NAS staff and students.

Staff and students are requested to donate their used books. They are invited to leave a note with their donated books, sharing a personal recommendation, a favourite quote, or an inspiring message for the next reader.

About the Campaign:
Mandela Day, observed annually on 18 July, is a global celebration commemorating Nelson Mandela's life and inspiring positive change. This year, the theme for Mandela Day is Climate, Food and Solidarity, focusing on raising awareness, inspiring action, and fostering unity in addressing crucial challenges of our time.

Let's Make a Lasting Impact:
Mandela Day 2023 serves as a reminder of our immense power as individuals and as a collective. By contributing to the free mini library, we can inspire generations and cultivate a love for reading in our community.

Take a book. Leave a book. Share a book. Love a book.

For more information, contact Mrs Michelle Bheemraj at michelle.bheemraj@up.ac.za

Institutional Sustainability

UP launches its Digital Strategy

The University of Pretoria has embarked on a new era with the launch of our Digital Transformation Strategy!

The digital transformation strategy is the result of a two-year-long process which saw the University's leadership team, together with an external consultant, craft a strategy and a strategic roadmap to enhance the institution's digital environment and cement its position as a University of the future.

In higher education, digital transformation is defined as using digital technologies to better serve customers and improve and streamline operational performance. The University has two beneficiaries that are impacted differently by digital transformation – students and staff – with a unique vision required for each.

For students, it's about building an integrated, inclusive, and enabling environment that will support their success, preparing them for the technological future of work and allowing them to regularly upskill through the University of Pretoria as their chosen institution throughout their careers.

Staff require digital support and literacy, multiple integrated platforms that enable staff mobility and data-driven lectures, and an effective and efficient administrative eco-system as the University builds its digital footprint internally and externally.

Our goal is to make a difference in the lives of our students, staff, alumni, and partners and lead UP to have a more significant impact on society.

We invite the UP community to contribute and support this digital transformation process and adopt our five Digital Transformation Strategy Goals.

Follow the link to learn more.

Successful Next-Generation Sequencing Open Day

The newly launched University of Pretoria Genomics Lab (UPGL), in partnership with DIPLOMICS and the African Centre for Gene Technologies (ACGT), hosted a successful and highly informative Next-Generation Sequencing Open Day at the end of June.

The hybrid event was attended by 220 staff and students from 42 institutions. Attendees gained valuable exposure to the technical foundations and specific applications of the most common high-throughput sequencing platforms.

Presentations by the DIPLOMICS Genomics nodes at CENGEN and the University of the Western Cape focused on the recent progress in sequencing the spekboom and marine bacterial genomes. Proceedings were concluded by short research presentations providing practical research methodology and analysis advice. A critical part of the day's proceedings was the networking opportunities during the breaks, while attendees could also discuss their research requirements and solutions with exhibitors representing the sequencing platforms. A short highlight video of the proceedings will be available presently.

During the Open Day, the new UPGL was launched by Prof Barend Erasmus, the Dean of the Faculty of Natural and Agricultural Sciences and Dr Shane Murray, Genomics Coordinator for DIPLOMICS.

The UPGL represents a collaboration between the University of Pretoria and DIPLOMICS to provide South African researchers with an Oxford Nanopore long-read sequencing service. Following the delivery and commissioning of its new P2 Solo instrument, the UPGL will be involved in the initial phase of DIPLOMICS'S 1KSA sequencing project, which aims to sequence 1000 South African plant, animal, fungal and bacterial genomes to assist biodiversity research.

Interested parties can contact Dr Nicky Olivier (nicky.olivier@up.ac.za) or Renate Zipfel (renate.zipfel@up.ac.za).

In-person attendees of the UPGL NGS Open Day

The presidents of German funding organisations the German Academic Exchange Service (DAAD) and the Alexander von Humboldt Foundation and delegates with UP staff and alumni.

University of Pretoria postgraduate students impress German funders

The University of Pretoria (UP) recently hosted the presidents of the German Academic Exchange Service (DAAD) and the Alexander von Humboldt Foundation, organisations which have provided funding for at least 41 UP PhD and postdoctoral students since 2010.

"It is good to see that this [relationship with UP] is a thriving example of South Africa-German research collaboration, and that capacity is built up jointly with so many personal links that have grown over so many years and decades," said DAAD President Professor Joybrato Mukherjee after engaging UP students and academics who are alumni of research programmes funded by the DAAD and the Alexander von Humboldt Foundation.

Prof Mukherjee was joined by Professor Robert Schlögl, President of the Alexander von Humboldt Foundation, members of the German parliament, German embassy representatives and directors-general of foreign affairs and science and technology for a visit to UP's Hatfield Campus and Javett-UP Art Centre, where they viewed the iconic Mapungubwe Gold Collection. The visit took place on Tuesday, 27 June 2023.

"We come here and see a wonderful bunch of people, alumni of DAAD and the Alexander von Humboldt Foundation, who have established close links in research and research collaborations with German institutions and this university," Prof Mukherjee said.

DAAD and Alexander von Humboldt Foundation are global players in funding research and individuals. The organisations have funded 18 PhDs at UP's Social Insects Research Group (also known as the Bee Group, in the Department of Zoology and Entomology) between 2010 and 2020, and nine in 2023. They are also currently funding 14 PhDs in entomology.

The Alexander von Humboldt Foundation promotes international academic cooperation between excellent scientists and scholars from Germany and abroad. Globally, DAAD has funded more than 2.8 million students and researchers.

"I was very impressed by the quality of the facilities," Prof Schlögl said after engaging UP students from the Department of Zoology and Entomology. "I was very impressed by the quality of the research and the openness of the exchange. Being here and seeing how it works was a great experience."

Dr Silindile Maphosa, a recent PhD graduate in biotechnology, said she would only be where she is today with the funding from DAAD, because doing her research would have been unaffordable. She was funded from 2019 and received an extension of funds in the wake of the COVID-19 pandemic. "I come from a family that does not have that many graduates. Being the first in my family to get a PhD was a huge accomplishment. My parents would not be able to take me through my education as far as I have come, so I am grateful to DAAD," she said.

Jackson Muyobela, a final-year PhD student in entomology, has been receiving funding from DAAD since 2020. He was also granted an extension after the pandemic. "My dream would not be possible without this kind of support. Paying for PhD studies can be as expensive as half a million. Most of us would not afford to cover the costs of doing such research," he said.

"It is interesting and also fulfilling to myself to see that the people who have funded me and my students are impressed with what you do," Professor Yusuf Abdullahi Ahmed, Associate Professor of Zoology and Entomology, said. "The credit goes to our institution, the University of Pretoria. This success story should open more avenues for further collaborative funding. It was interesting to see that the thing they liked most was the recycling of ideas, from the older people to us, and to the students, and that we could say where the students are, what they are doing, and what they are coming for.

"If you look at it closely, you can see that it is not only about the region, but the whole continent at large," Prof Ahmed continued. "For us, being able to train graduates who are up to par and who can compete with any other person from any part of the globe is the most impressing."

Make today matter by giving

THE UP WAY

The second semester kicked off with a bang at the Hatfield Campus with UP–Topia, an activation encompassing Giving Matters, THE UP WAY and Make Today Matter.

The UP Giving Matters Campaign is designed to engage the university communities locally (e.g. students, staff, executives, etc.) and externally (alumni, corporates, foundations, etc.) in the united, committed belief in the power of philanthropy to do good. The goal is generally around the number of individual gifts secured rather than just the financial return. It is about raising philanthropic awareness and instilling a culture of giving to the university communities.

The Giving Matters is a three-year fundraising campaign to raise R100 million by 2024 to supplement UP's day-to-day fundraising projects, which offer financial assistance to "missing middle" students. These are students whose family's household income is above R350 000 to qualify them for NSFAS funding but do not earn enough to afford higher education or secure a bank loan to fund their studies.

The campaign was initiated in 2022, raised R19.3 million, and reached 456 donors by August 2022. The campaign so far in 2023 has raised R15.2 million and exceeded the target of 500 donor participation by 59% and 74% (795) from 2022 participation. The campaign is still in motion to meet and exceed the 2024 target.

You can still give through the UP Giving Day platform – www.givingday.up.ac.za/p/uniofpretoria2023/pledge/ and the online credit card facility by going to www.up.ac.za and clicking on Giving to UP > Ways to Give > Online Credit Card Donation.

Social Responsiveness and Societal Impact

Students help set up educational trail to raise awareness about plant life on Mamelodi Ridge

Two plant science honours students at the University of Pretoria (UP) are trying to establish a trail for school learners to educate Tshwane residents and preserve the natural splendour of the green mountain ridge rising above Mamelodi.

The project –coordinated by students Lynadia Samuel and Jessica Berry – reflects the growing support that UP botanists and others are giving Mamelodi residents in raising awareness about this almost unspoilt natural haven above one of Tshwane's largest residential areas. Samuel and Berry will build on work already done by last year's cohort of honours students from UP's Department of Plant and Soil Sciences.

"This work forms part of an elective community engagement module, called BOT 789, Plants, People and Planet, that they choose to complete as part of their honours year," says project leader and Department Head Professor Nigel Barker.

Prof Barker says the envisaged educational trail is part of collaborative efforts with selected Mamelodi educators to raise awareness about the area's value to society. It will contribute to school syllabus content on biodiversity and the environment.

The trail will start at the indigenous medicinal plant nursery of the Mothong African Heritage Trust in Mamelodi West. The nursery was established more than 20 years ago by local traditional medicinal healer Dr Ephraim Mabena, who says he was inspired after being visited in a dream by his ancestors. He uses the plants grown in the nursery in his practice and provides some to other medicinal healers. He sees the nursery's efforts as conserving indigenous plants and promoting ethical rather than unsustainable wild harvesting of natural resources.

University of Pretoria honours in Plant Science students Ms Jessica Berry, Ms Manare Moloto and Ms Lynadia Samuels during a recent visit to Dr Ephraim Mabena's medicinal plant nursery in Mamelodi. They were accompanied by medicinal plant scientist Dr Gary Stafford (right) of the UP Department of Plant and Soil Sciences.

"I was instructed to convert an illegal dumping site into a friendly environmental place," Dr Mabena said in a UP video recently. "I was told I must go and say thank you to these mountains. Nature plays an important role in our lives, religiously, politically, and otherwise.

"We must learn from and protect these plants. When we look at these plants, they are a mirror to oneself," says Dr Mabena, who has received numerous accolades for his work related to medicinal plants. His relationship with UP started in the 2000s when medicinal plant researcher Prof Namrita Lall approached him to help exchange ideas with her students.

Prof Barker says he was inspired by Dr Mabena's passion for sharing his knowledge and conserving Mamelodi Ridge for future generations. "The work we are doing is built around special relationships and friendships, ones that are in turn built around a mutual love for plants and botany… It's important to raise awareness of botanical gems such as Mamelodi Ridge. Among other things, it provides examples of indigenous food plants that people used in the past."

"I hope we will be able to formalise medicinal and other plant research projects and extend the informal biodiversity survey work that we have been doing since 2021," Prof Barker says.

The surveys were started by botanists associated with UP and the National Herbarium in Pretoria after it was discovered that only around 250 plants from either Mamelodi Ridge or Donkerhoek, a ridge further to the east, were at that stage included in the National Herbarium database.

The trail will start at the indigenous medicinal plant nursery of the Mothong African Heritage Trust in Mamelodi West. The nursery was established more than 20 years ago by local traditional medicinal healer Dr Ephraim Mabena.

FABI and NAS celebrate Mandela Day by conserving biodiversity

Invasive alien vegetation is one of the greatest threats to biodiversity. In celebration of Mandela Day, an enthusiastic group of staff from the Forestry and Agricultural Biotechnology Institute (FABI), along with some colleagues from the departments in NAS, Plant and Soil Sciences, Biochemistry, Genetics and Microbiology and Bioinformatics, gathered at the Innovation Africa @UP campus on the morning of 17 July to clear invasive weeds from an important research environment.

The weed-clearing effort focused on a 2Ha tract of low-lying grassland adjacent to the Engineering 4.0 building. This is one of the last lowland grasslands in-and-around Pretoria; similar grasslands have been almost entirely lost to urbanisation, and the University of Pretoria has agreed to conserve it for the foreseeable future.

In general, the grassland biome in South Africa is the second largest and the second most diverse. Sadly, it has also suffered the most habitat loss of all biomes in the country and has the lowest level of protection. Invasives are amongst the greatest threats to this biome, emphasising the importance of the weed-clearing effort in celebration of the life of one of South Africa's greatest leaders. The grassland area where the weeds were (only partially) cleared is a widely-used resource for teaching and research by various UP departments, including students and staff associated with FABI.

Everyone rolled up their sleeves and spent just over an hour clearing invasive woody weeds, including Syringa (*Melia azedarach*) and Bug weed (*Solanum mauritianum*), as the first step to eventually removing all these invasive plant species from the important grassland.

Sci-Enza's National Science Week Celebration

National Science Week is an annual countrywide celebration of the importance of science and technology in people's daily lives. It promotes greater awareness and appreciation of science and technology's contribution to the nation. The South African Agency of Science and Technology Advancement (SAASTA), an implementing arm of the Department of Science and Innovation, and Sci-Enza, the Science Centre of the University of Pretoria, hosted exciting activities during Science Week. The theme for 2023 was "Transforming lives through evidence-based science".

Moremi Melato (Science communicator) doing a Liquid Nitrogen show T FF Ribeiro Primary School in Mamelodi.

Through various activities, Sci-Enza celebrated science week by visiting schools around Gauteng. These schools fall between quantile rank 1-5 around Hammanskraal, Winterveld, Mamelodi, Eersterus, Johannesburg, Atteridgeville and Wonderpark. We covered six primary schools, Grade R-6 learners and four secondary schools, of which we covered 1 308 learners. The Sci-Enza team performed a Liquid Nitrogen Show covering topics such as the water cycle, phases of matter, hot and cold and gases.

For secondary schools, we performed a "Gum to Bum" show, a show-and-tell set-up of how the digestive system occurs in the human body, from when you put the food in your mouth to when you excrete. This show is aligned with CAPS ATP for Grade 9, Natural Sciences subject.

Science Week is celebrated across all ages. To cater for out of school people, we ran "Planetarium shows for the public at Sci-Enza, in the afternoons. The shows were focused on "space and astronomy" topics. The following shows were showcased: Rising Stars – which showcases the journey of South African Astronomy. The solar system entails the region in space where humans are located in the Solar system and the characteristics of all eight planets. The centre hosted 646 public during science week.

Furthermore, the Department of Basic Education hosted a workshop for 57 teachers. The workshop's objective was to aid support in the Natural Science subject for Primary school teachers within Tshwane South District. The intervention was in the lesson study, where lesson plans were further explained and made teaching more accessible.

Sci-Enza continues to make a difference in society even outside the focus weeks.

World Mosquito Day: UP cocktail dinner communicates mosquito and malaria messages through culinary creativity

Celebrating World Mosquito Day, commemorated annually on 20 August, the University of Pretoria Institute for Sustainable Malaria Control (UP ISMC) hosted an innovative safari cocktail experience, aimed at illustrating how something as simple as a cocktail dinner can be used to promote health and enhance awareness about mosquitoes. The meal was created by UP students and staff using ingredients with active compounds that may have the potential to repel mosquitoes in large quantities.

The UP ISMC is a transdisciplinary research entity housed in UP's Faculty of Health Sciences. The health-awareness cocktail dinner formed part of the third module of its Leadership and Management Training for Impact in Malaria Eradication course, which took place at UP's Future Africa Campus from 7 to 12 August 2023.

A total of 48 (25 female) course participants from eight SADC countries – Angola, Botswana, Eswatini, Mozambique, Namibia, South Africa, Zambia, and Zimbabwe – took part in the module, with sessions focusing on the science of malaria and malaria elimination. A session on new ways of promoting health and malaria awareness concluded with the novel cocktail dinner.

From left: Anezka van Schalkwyk, Dr Hennie Fisher and Azille Neuhoff

"Mosquitoes continue to have a devastating impact on global health," said Dr Taneshka Kruger, Project Manager of the UP ISMC. "On World Mosquito Day, we commemorate Sir Ronald Ross, who in 1897 discovered that female mosquitoes from the Anopheles genus actively transmit malaria. The best way to prevent malaria transmission is to ensure that people avoid being bitten by malaria-carrying mosquitoes, and this can be communicated through health promotion and malaria awareness creation."

THE POWERFUL UNIVERSAL LANGUAGE OF FOOD

The innovative culinary experience was hosted in collaboration with UP's Department of Consumer and Food Sciences in the Faculty of Natural and Agricultural Sciences. Two fourth-year BConSci (Food Retail Management) students, Azille Neuhoff and Anezka van Schalkwyk, researched and conceptualised the menu with culinary arts lecturer Dr Hennie Fisher. "This exciting opportunity allowed me to discover more about the food we consume, and how food can be used to raise

awareness about a disease as deadly as malaria," Neuhoff said.

"What a privilege to bring two different fields of interest together through food, " van Schalkwyk added. The project formed part of the students' experiential training in the industry module. A mix of first- to fourth-year students helped prepare a feast for the senses that could also help repel mosquitoes.

As part of the immersive experience, guests were escorted through three food "stations", where Dr Kruger provided interesting titbits about mosquitoes and the potential repellence of the foodstuff used in the menu.

The first station was positioned by the lemon orchard a few metres from Future Africa's entrance, where paraffin lanterns, fairy lights, and the light perfume of lemons hanging in the air welcomed the guests.

As Dr Kruger explained, research suggests that certain compounds present in citrus oil, such as limonoids and terpenes, found in citrus fruit peels, possess natural insect-repelling properties. Seaweed (nori in the sushi) is not commonly used as a mosquito repellent. However, certain types of seaweed extracts or compounds derived from seaweed may have properties that can be used in mosquito-repellent products. The tomato in the Bloody Mary contains thiamine (Vitamin B1), which has been touted as a systemic insect repellent since 1943, and denounced as an ineffective placebo for just as long.

Guests then congregated by Future Africa's large pond, where outdoor heaters were used to break the August evening chill. While water itself is not a direct cause of malaria, stagnant water serves as a breeding ground for the mosquitoes that transmit the disease, providing ideal conditions for laying their eggs and completing their life cycle.

Guests feasted on delicious stew while homemade ginger beer quenched their thirst. Tomatoes, beans, and lentils are rich in thiamine and are said to release a smell that repels mosquitoes and other bugs. When consumed, garlic, onions, and apple cider vinegar are said to change the way you smell and make you less detectable to mosquitoes. Rosemary's woody scent also keeps mosquitoes away. Research shows that ginger can repel certain mosquito species.

Dr Kruger advised that people should take the information provided during the event with a pinch of salt. "Although the natural active ingredients mentioned may have some mosquito-repelling properties, they are unlikely to provide the same level of protection as commercial mosquito repellents – which contain active ingredients like DEET or picaridin – and would probably need to be consumed in large quantities to have any potential impact," she said. "Products that have been specifically designed and tested for their ability to repel mosquitoes, and contain active ingredients that have been rigorously evaluated for their safety and effectiveness, should be used."

Currently, UP ISMC researchers are identifying and testing natural active compounds in plants with the potential for further development as malaria parasite-killing drug candidates. But, this innovative culinary collaboration has created scope for possible future research towards finding more natural repellents to ward off mosquitoes, as part of innovative vector control.

Naartjies, strawberries dipped in chocolate, marshmallows, cake-pops, giant meringues, jelly babies, jelly beans, blondie squares

Virgin Bloody Mary

Smoked trout and carrot sushi

New PSANA Chair wants to build networks

Dené Visser was recently elected as the new Chair of the Postgraduate Student Association of the Natural and Agricultural Sciences (PSANA).

Dené Visser

Q Are there any exciting plans for PSANA for the rest of the year?

We have a few community engagement activities planned for this year, including a food drive for Wollies Animal Shelter, which will run at the beginning of September. We also plan to host more socials and invite final-year students so they can discuss the whats and hows of postgraduate degrees.

Q What do you envisage for PSANA as the new Chair?

I envision a PSANA with a full committee representing all departments in the Faculty, with all of the representatives working together to create events that assist the postgraduates of the Faculty in their research and building their social networks.

Q What benefits does PSANA have for postgraduate students in NAS?

PSANA represents the postgraduate students of the NAS Faculty. We discuss challenges our fellow students may face and work towards potential solutions through events or sharing concerns with relevant parties. We already consider all our Faculty's postgraduates as our members. Still, we encourage everyone to participate in our events as they enrich our lives and lead to meeting like-minded people who may become good friends or collaborators. I would also encourage postgraduates to become part of our committee as it helps build leadership skills, creates an understanding of what is happening in the university, and looks good on a CV.

Q What did PSANA mean to you as a member before becoming Chair?

I believe PSANA played an important role in identifying the struggles of postgraduates and helping the Faculty to work out potential solutions.

Q You are doing your MSc in Zoology? What is your area of specialisation and research focus?

My research investigates trade as a potential threat to South African amphibians. I hope to identify which of our indigenous species are presently being threatened by the wildlife trade market, primarily relying on data I will collect from social media and websites, as well as identifying amphibians that may be vulnerable to trade in the future.

Misha Malherbe

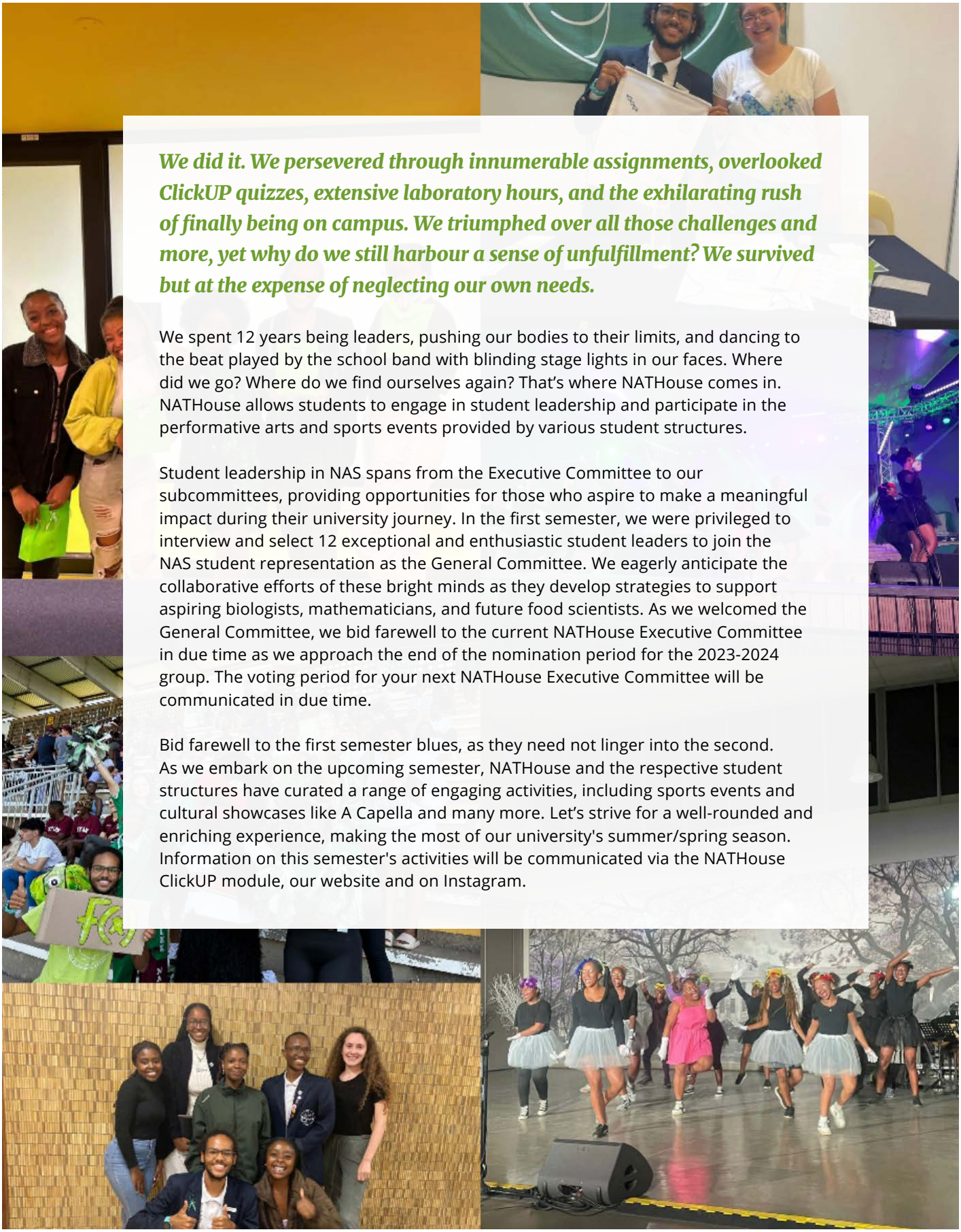
Q Who is the new Vice Chair of PSANA?

Misha Malherbe is the new Vice-Chair, a PhD student from the Department of Geography, Geoinformatics and Meteorology.

COFFEE WITH PSANA

PSANA recently hosted a social for the Faculty of Natural and Agricultural Sciences (NAS) postgraduate students. Participants were invited to join us for a cup of coffee or tea on the roof of the Plant Sciences building and were surprised with some cupcakes when they arrived. We had fun chatting with everyone there! We plan to have similar events in the future and invite final-year undergraduate students to the social later this year. We had several people signed up for short interviews regarding their research. Please keep an eye on our social media platforms so you can join us for our next event and see the super cool things the postgraduates in our Faculty get up to.

MORE THAN A STUDENT NUMBER



We did it. We persevered through innumerable assignments, overlooked ClickUP quizzes, extensive laboratory hours, and the exhilarating rush of finally being on campus. We triumphed over all those challenges and more, yet why do we still harbour a sense of unfulfillment? We survived but at the expense of neglecting our own needs.

We spent 12 years being leaders, pushing our bodies to their limits, and dancing to the beat played by the school band with blinding stage lights in our faces. Where did we go? Where do we find ourselves again? That's where NATHouse comes in. NATHouse allows students to engage in student leadership and participate in the performative arts and sports events provided by various student structures.

Student leadership in NAS spans from the Executive Committee to our subcommittees, providing opportunities for those who aspire to make a meaningful impact during their university journey. In the first semester, we were privileged to interview and select 12 exceptional and enthusiastic student leaders to join the NAS student representation as the General Committee. We eagerly anticipate the collaborative efforts of these bright minds as they develop strategies to support aspiring biologists, mathematicians, and future food scientists. As we welcomed the General Committee, we bid farewell to the current NATHouse Executive Committee in due time as we approach the end of the nomination period for the 2023-2024 group. The voting period for your next NATHouse Executive Committee will be communicated in due time.

Bid farewell to the first semester blues, as they need not linger into the second. As we embark on the upcoming semester, NATHouse and the respective student structures have curated a range of engaging activities, including sports events and cultural showcases like A Capella and many more. Let's strive for a well-rounded and enriching experience, making the most of our university's summer/spring season. Information on this semester's activities will be communicated via the NATHouse ClickUP module, our website and on Instagram.

Final farewell to Prof Rudi van Aarde, leading African conservationist

Prof Rudi van Aarde, a leading African conservationist, died on 22 July 2023 after a heart attack. He is survived by his collaborator and wife of 11 years, Camilla Nørgaard. His is a legacy of innovative and practical conservation. In 1998, he founded the Conservation Ecology Research Unit (CERU) at the University of Pretoria and led this group with significant impact until his death.

Rudi was born on 21 September 1951 in Modimolle, called Nylstroom at the time, in Limpopo Province. He completed all his undergraduate and postgraduate degrees at the University of Pretoria, completing the PhD in 1984. His PhD training was in mammalian reproductive hormones under the supervision of the late Prof John Skinner. Before being appointed as a senior lecturer at the University of Pretoria in 1986, he had several visits to European research groups. He formally retired from the University of Pretoria in 2017 but remained research active on a postretirement contract until the end. At Pretoria, his research excellence was recognised with outstanding academic achiever awards from 2000 to 2011. He was actively involved in several science organisations in various leadership positions, notably the Zoological Society of South Africa, the Southern African Wildlife Management Association, the Royal Society of South Africa and the South African Scientific Committee for Antarctic Research.

His early work was on Marion Island and the French Kerguelen Islands. The environmental challenges on these islands were (and are) invasive mammals. Rudi's earlier work on the population dynamics of invasive house cats on Marion Island laid the foundation for an eradication programme, and his career took a practical turn when he became involved in designing and implementing a plan to remove these house cats from Marion. The project's success is documented in Bester et al. [1]; the cats were all gone by 1991. This first experience of practical focus on real-world conservation founded in solid science was to become a pattern for much of Rudi's career.

In the early 1990s, Rudi started working on dune forest communities in northern KwaZulu-Natal to design a restoration programme for a dune mining operation in this sensitive area. The success and longevity of this restoration programme have not only resulted in significant biodiversity gains for these erstwhile mining

areas, but it made a significant contribution to the science of restoration ecology. To this day, the rehabilitated dune forests are a testament to Rudi's vision for practical conservation outcomes.

By the mid-1990s, Rudi was transitioning from endocrinology studies to conservation, partly triggered by elephant-related research in a small reserve in northern KwaZulu-Natal. He met Prof Stuart Pimm at a conference in Budapest in 1995, and he invited him to visit South Africa the following year. This was the start of a 30-year friendship and collaboration. Rudi felt that studies of elephant reproduction were unlikely to give answers to what was perceived as the problem of too many elephants in Kruger National Park. Until shortly before, an average of about 500 elephants a year were culled to keep numbers at some level expert opinion deemed "right." The kill was hugely controversial. Might putting elephants on contraceptives solve the perceived problem?

Rudi answered that contraception was a bad idea and involved massive disruption to the individual elephants and their social behaviour. Stuart's concern was how many elephants would need to be treated to slow the population growth. Together they worked on papers to calculate the answer: it was in the thousands, making the approach impractical for large populations such as Kruger's [2].

The solution for Kruger, Rudi argued, was to remove the fence between it and the adjacent Limpopo National Park in Mozambique and close some of the many artificial waterholes. Those actions were bitterly contested but eventually prevailed.

A quarter century of elephant studies followed. Few people have seen as much of Southern Africa as Rudi, and indeed no one has photographed so many elephants (see some of his award-winning photos. He had a unique breadth of experience of the African landscape that took him from Addo in the south to Etosha in the west, Zambia and Malawi in the North and Mozambique in the east. Hundreds of thousands of kilometres of roads indeed, and time to think about elephants and conservation at the broadest scales.

The outcome was his classic "mega parks for metapopulations" [3] — a view that elephants need room to roam. Isolated populations cannot flourish and can harm when imprisoned behind fences and other barriers.

Since retirement, CERU meetings were often at Rudi and Camilla's home. A lovely garden setting conducive to talking and vigorously debating all that we learned from the many trips and adventures, with dogs on laps for added company.

Rudi trained a generation of young African conservation professionals (126 postgraduate students and postdocs, to be exact), and many of them have gone on to have a significant impact on conservation in southern Africa. He brought several of his international networks to Pretoria, notably Stuart's, and the subsequent collaboration (and social events!) between postgraduates from different parts of the world cemented lifelong networks for many of the CERU alumni. Prof Barend Erasmus, the current Dean of the Faculty of Natural and Agricultural Sciences, vividly remembers Rudi in full swing in teaching third-year ecology; Rudi's own experience, passion for and commitment to conservation made for paradigm-shifting lectures.

In the last few months, a central event was his book outlining his vision for elephant conservation and, indeed, that of the larger African ecosystem. As so much of his work was supported by the International Fund for Animal Welfare, Rudi completed it but did not see a physical copy. "Let Elephants Roam" will appear in the New Year. It is an appropriate legacy for his commitment to conservation.

Acknowledgements:
Prof Stuart Pimm and Prof Barend Erasmus

References:

[1] Bester, M.N., Bloomer, J.P., Van Aarde, R.J., Erasmus, B.H., Van Rensburg, P.J.J., Skinner, J.D., Howell, P.G. and Naude, T.W., 2002. A review of the successful eradication of feral cats from sub-Antarctic Marion Island, Southern Indian Ocean. South African Journal of Wildlife

]2] Whyte, I., van Aarde, R. and Pimm, S.L., 1998, May. Managing the elephants of Kruger national park. In Animal Conservation (Vol. 1, No. 2, pp. 77-83). Cambridge University Press.

[3] Van Aarde, R.J. and Jackson, T.P., 2007. Megaparks for metapopulations: addressing the causes of locally high elephant numbers in southern Africa. Biological Conservation, 134(3), pp.289-297.

Prof Rashid Hassan – final goodbye to a legend in environmental and natural resource economist

The scientific community has suffered a significant loss with the passing of Prof Rashid Hassan, an influential figure in environmental and natural resource economics. At the time of his passing, Prof Hassan was an Emeritus Professor in the Department of Agricultural Economics, Extension, and Rural Development at the University of Pretoria. He joined the department in 1997 and was the founding director of the Centre for Environmental Economics and Policy in Africa (CEEPA). In 2020, the Government of Sudan appointed him Secretary-General for the Higher Council for the Environment and Natural Resources.

Prof Hassan's academic journey included earning a bachelor's degree in 1977 and a master's degree in 1983 in Agricultural Economics from the University of Khartoum in Sudan. This was followed by another master's degree in Agricultural Economics and a PhD in Economics in 1988 and 1989, respectively, from Iowa State University in the United States of America.

Prof Hassan's academic and research career began as a research assistant at the University of Khartoum in 1981. He later joined the University of Juba in Sudan as a lecturer in the College of Social and Economic Studies. In 1984, he was appointed head of the Information Section in the Division of Economic Planning and National Energy Administration in Sudan's Ministry of Energy and Mining. He served as a research and teaching assistant in the Department of Agricultural Economics at Iowa State University between 1985 and 1989. After completing his PhD in 1989, he joined the International Maize and Wheat Improvement Center (CIMMYT) in Kenya as a postdoctoral fellow. He later became the regional economist in the same organisation. In 1995, he was appointed as an environmental economist, principal researcher, and leader of the economic analysis and policy support group in the Division of Water, Environment, and Forest Technology at the CSIR in Pretoria.

The impact of Prof Hassan's work extends beyond academia as he advised numerous governments and international organisations on climate change issues and adaptation strategies. His extensive work encompassed topics such as climate change, sustainable management of natural ecosystems, and economics and policies related to governing shared resources. His teaching, research and policy engagement efforts played a pivotal role in shaping environmental policy discussions in Africa and globally, addressing critical concerns related to environmental and natural resource sustainability.

Professor Hassan's leadership extended to several international projects. Among these were initiatives such as the Sida-funded programme, coordination of the Resource Accounting Network for Eastern and Southern Africa (RANESA), the design and leadership of an Africa-wide project funded by GEF-World Bank that explored the impacts of climate change on agriculture, and the Sida-USAID-funded environmental accounting project in eastern and southern Africa.

Engagement with national and international institutes further underlined Prof Hassan's commitment to his field. He served as a member of various organisations, including the African Ministerial Conference of the Environment; the Board of the International Society for Ecological Economics; the Board of the Stockholm Resilience Centre; the Board of the National Forest Corporation, Sudan; the Board of Nuclear Energy Institute, Sudan; Board of the National Research Centre, Sudan; Academy of Sciences for South Africa (ASSAF) standing committee on water and Board of Human Sciences Research Council of South Africa. He was also a member of the assessment panel that compiled the report on the state of climate change science and technology development for the South African government.

Prof Hassan's accomplishments were duly acknowledged through various awards and honours. In 2019, he became a member of the US National Academy of Sciences in recognition of his exceptional contributions to original research. In 2020, he received the Kenneth Boulding Award from the International Society for Ecological Economics. With more than 50 000 citations and an h-index of 53 in Google Scholar, he was ranked second in South Africa in Economics and Finance according to the 2023 Edition of Research.com. At UP, Prof Hassan received the Chancellor Medal in 2010 and Exceptional Academic Achiever Award four times between 2005 and 2016. Prof Hassan played an instrumental role in capacity building by mentoring and guiding over 50 master's and doctoral students.

Prof Hassan's legacy comprises ground-breaking research, transformative mentorship, and a resounding environmental and natural resource economics influence. He leaves a remarkable footprint that has enriched the academic landscape of Africa and beyond. He is survived by his spouse and four children.

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