NWU®

ENVIRA

UESM Newsletter

Winter Edition 2022

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ENVIRA

Interactive Buttons

Announcements

Ethics

Accolades

Calliper

Interview: Professor Frank Neumann

Visiting Scientist: Dr Sara Palacio

New Appointments

Research Group Showcase

Community Engagement

Student Association: FNAS Chapter

Human Health vs Food Security

Capers on Coral Reef Islands: Part 4

Woodbush Granite Grassland Butterflies

Restoration of our Degraded Soils?

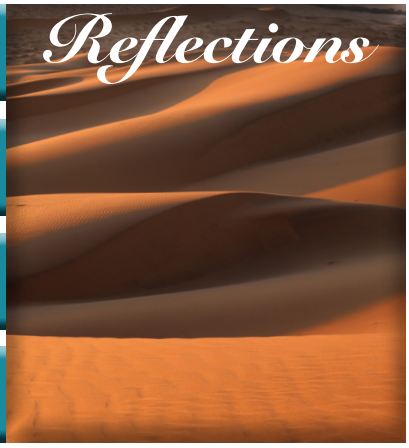
Disasters are Never "Natural"

Nature Based Solutions for Africa

Savanna Science Network Meeting

PARG strengthens collaborations in Namibia

Lichen expedition to Gobabeb, Namiba



Fact Box

Graphical Abstract Competition Winners

Future Competitions

Hobby Showcase

Clarissa Minnaar (Sub-editor) and Frances Siebert (Editor)

Editorial

The first half of 2022 has passed as quick as a flash. Likewise, the first two years of ENVIRA, as we are entering year three of our UESM quarterly Newsletter with this Winter edition of 2022. Considering the rather uncertain times of Winter 2020, we now share in all celebrations after the lift of most COVID-19 related restrictions.

'Science is never static, never stagnant and never content with the boundary it has reached' - LP Jacks.

In like manner, ENVIRA is dynamic in its content, layout and offerings. We are therefore proud to introduce more sections, and an improved layout in this Winter edition.

We provide that ENVIRA readers will *Stay Informed* with ***Announcements*** and important latest ***Ethics*** communique, while the *Academic Performance* section acknowledges the hard work and successes of our colleagues. Since there are many faces linked to the pride and successes of the UESM, we introduce the *People* behind research, computers and laboratory equipment in the regular ***Interview***, ***Visiting Scientists***, ***New Appointments***, ***Research Group Showcase***, ***Community Engagement*** and ***FNAS Chapter*** sections. We reflect on workshops, academic training sessions, conferences, field trips etc. in the *Reflections*, followed by the more comprehensive *Research Articles*, which remain our most valued section as it displays the research conducted by UESM staff and postgraduate students in a simple, yet informative way.

We conclude with a section called *For The Fun Of It*, which includes the regular ***Scienti ic Fact Box*** and ***Hobby Showcase***, where we flaunt the hidden talents and interests of staff- and postgraduate students. What started off as a 'summer special' in the first two years of ENVIRA, has now developed into a more regular ***Competitions*** section where we announce the winners of the previous competition, and present upcoming competitions.

We hope that you will find the new layout to be clear, enjoyable, and easy to follow. Your feedback is always greatly appreciated.

Happy reading!

Back to buttons

ANNOUNCEMENTS

UPCOMING PHOTOGRAPHY COMPETITION

Our annual Photography Competition is coming up soon. So, start getting your photos ready.

This year, we will also have a category for VIDEO FOOTAGE!

Let's get shooting!

UESM: EFUNDI FORMS

Get all the admin forms here - the UESM One-Stop Source

Did you know that all the procedures and documents for UESM staff and students are uploaded onto a single eFundi page?

Click **here** to visit the UESM eFundi portal

This site contains the latest version of the most important forms used by the unit.

ETHICS

Visit the FNAS eFundi link for a detailed summary of the ethics process.

If you do not have access to the page view the guide here.

For any queries or assistance, please contact:

Madelien Burgers: 37630067@nwu.ac.za

Roelof Burger: Roelof.Burger@nwu.ac.za

More information on Ethics here.

COMMUNICATE YOUR NEWS

Corporate Communication is requesting your news

Share your newsworthy events, achievements (staff and students), projects, community engagement research, teaching-learning breakthroughs, or any relevant news that may position the NWU. These news items are used on various internal and external university platforms and are also made available to the media.

Complete this template and submit it to louis.jacobs@nwu.ac.za.

Academics are also encouraged to submit opinion pieces to Corporate Communications whereby these pieces will be directed to the appropriate media houses.

CAMPUS TREE ROUTE

Stretch your legs, go outside and explore campus on the 2km Tree Route.

Important information:

- Full length article to the tree route (as seen in the ENVIRA Autumn Edition 2022)
- Species List
- Map

CHANGE YOUR AFFILIATION ON RESEARCH GATE

Change your affiliation to the Unit for Environmental Sciences and Management on Research Gate

This is easy to do! You can complete it in less than a minute the next time you log on to your Research Gate **'profile'** page. This is the page with your name, photo and other info. On the right there is a box with the heading **'Current Affiliation'**. If under **'Department'** it states **'Unit for Environmental Sciences and Management'** you have nothing further to do. If anything else, then click on **'edit'** to the right of **'Current Affiliation'** and then **'edit current affiliation'**. Under **'Department'** scroll and choose **'Unit for Environmental Sciences and Management'**. Do not copy and paste, just start typing and it will appear. Right at the bottom click **'save'**.

Welcome to one of the most active, dynamic and productive research communities of the NWU!

Research Ethics in Environmental Sciences and Management

Roelof Burger & Madelien Burgers

The Senate has decreed that all research, including those by MSc and PhD students, should have an ethics number and all studies need an ethics review. Higher degree administration requires that all students have a unique ethics number before they are allowed to submit. Ethics approval is only given for one year. Renewal of the ethics certificate is done after an annual review. Researchers and supervisors should be cognisant that ethics approval should be obtained before research can start.

What you need to know about ethics in the Unit for Environmental Science and Management

1. All research needs to be reviewed by one of the ethics committees at the NWU, including masters and doctoral students.
2. No research is allowed to start without an ethics number.
3. No student is allowed to submit his dissertation without an ethics number from one of the NWU ethics committees.
4. The ethical responsibility of student studies lies with the supervisor, not the student.

For low and no risk studies, the process is fairly quick and painless. Start by submitting an application to https://tinyurl.com/fnasrec

Note that MSc and PhD students need to provide an ethics number BEFORE they can register the title of their research at the Faculty. All research projects with ethics numbers should be reviewed annually.
Click here for more on the dates, procedures, forms and information to obtain ethics approval described on the FNASREC page.
Having trouble accessing the page? Follow this link.
If you are interested to contribute towards ethics in FNAS, contact:
Madelien Burgers: 37630067@nwu.ac.za
Roelof Burger: Roelof.Burger@nwu.ac.za

See the full ethics process on the next page.

Upcoming FNASREC meeting dates 2022

28 July
25 August
29 September
27 October
24 November

The Ethics process:

Student

Submission of proposal documents to sub-programme

↓

Student presents, Scientific committee evaluates

Colloquium (online or face-to-face)

↓

Sub-programme scientific committee

Sub-programme scientific committee evaluates research proposal and makes recommendations and suggestions to improve the proposed research

↓

Sub-programme leader

Sub-programme leader consolidates all comments/suggestions into one evaluation document, signed by the members of the evaluation team (scientific committee)

↓

Student

Student/Researcher addresses comments/suggestions and prepare a revised proposal

↓

Supervisor / Student

Revised research proposal and scientific evaluation report sent to FNASREC

↓

FNASREC

FNASREC evaluates research for ethical clearance

↓

FNASREC

FNASREC provides feedback and/or ethics number to supervisor and student/researcher

Back to buttons

Congratulations

The following awards and accolades from the international scientific community demonstrate the high quality and significant impact of research within the UESM.

Sara Nigro Award for Women Achievers in Plant Sciences

The South African Association of Botanists (SAAB) acknowledges one female plant scientist annually for the quality and impact of her research. This year, the Sara Nigro Award for Women Achievers in Plant Sciences was awarded to **Dr Tomi Adetunji** for her outstanding contribution to nutritional- and medicinal plant science in South Africa. Dr Adetunji is a postdoctoral fellow in the Forb Ecology Research Group (FERG) under the supervision of professor Frances Siebert. Her research involves the nutritional and medicinal properties of selected indigenous forb species.

Dr Tomi Adetunji

Southern African Society of Aquatic Scientists (SASAqS) Gold medal

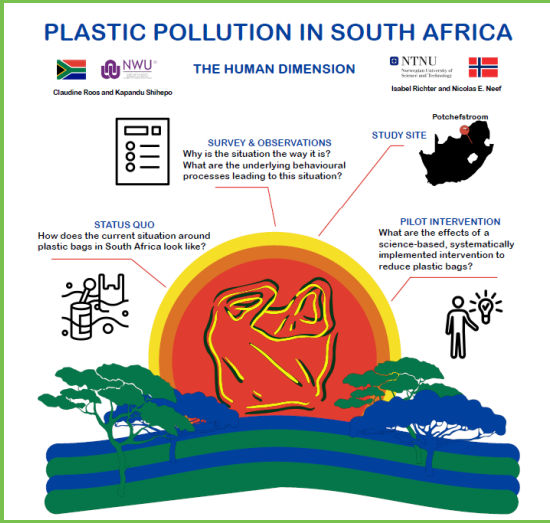
Prof Victor Wepener, Professor of Zoology in the School of Biological Sciences, received the SASAqS Gold Medal at the recent conference of the society. This is the highest honour awarded by SASAqS and was awarded to Prof Wepener in acknowledgment of the substantial contribution over the past 25 years to the aquatic sciences and knowledge generation in South Africa, Africa and globally. During the presentation of the medal to Prof Wepener, it was specifically highlighted that that throughout his career to date he has excelled in every single aspect of what it means to be an aquatic scientist and leading academic. This is reflected in his research outputs (>175 peer reviewed papers), leading international research projects (generated >R50 mil in research funding), student training (37 PhD and 77 MSc students graduated), curriculum development (tutored Masters in Ecological Water Requirements for the Department of Water and Sanitation), academic leadership at local (Vice President and President of SASAqS) and international (President of the Society of Toxicology and Chemistry – SETAC Africa) and community service (editorial boards of three international journals, South African representative on the Nanotechnology Technical Committee – TC229 of ISO).

Prof Victor Wepener

Students of the UESM's Water Research Group excelled at SASAqS 2022

During the recent annual conference of the Southern African Society of Aquatic Scientists (SASAqS) students from the UESM's Water Research Group cleaned the trophy cabinet by winning both student awards. PhD student Anja Vermaak won the award for SASAqS best student oral presentation for her talk entitled: "Amazing parasite diversity of *Diplodus capensis* (Smith, 1844) in South Africa" and MSc student Nichole Donough received the SASAqS best student poster presentation award for her poster entitled: "The use of *Caridina africana* as an indicator organism in nanomaterial toxicity assessments".

Nichole (left) and Anja (right)



SANO Competition's prize-winning poster.

NWU team in collaboration with NTNU wins SANO competition on addressing plastic pollution

Engaging all actors with the challenges we face in the attempt to reduce marine plastic pollution is a premise for successful, sustainable change. Therefore, NTNU established the SANO exchange program between Norway and South Africa in which plastic pollution should be reduced together with scientists, the industry, and communities. One part of the program is the SANO competition in which teams consisting of two Norwegian and two South African young researchers and students compete for a cash price of NOK 500 000, provided by The Norwegian Retailers' Environment Fund-Norway's largest private environmental fund, by sending in their project proposals.

The winners of the competition was announced on Thursday, 26 May 2022 at the Second International Conference of the African Marine Waste Network in South Africa.

Associate professor Isabel Richter and her team consisting of two colleagues from South Africa, **Dr Claudine Roos** and her master student **Ndapandula Shihepo** from North-West University, South Africa and a master student from NTNU, Nicolas Neef, are taking a psychological perspective to understand why, despite a levy on plastic bags and national policies to reduce their plastic bag spill into the environment, plastic bag consumption is still increasing in South Africa. In addition, the team is aiming to develop tailor made solutions.

(View poster on page 21).

Prof Eddie Ueckermann

Extra-ordinary professor to receive the Jim McCurthy award

Prof Eddie Ueckermann, an extra-ordinary appointee in the UESM, has won the McMurtry award to the value of USD 5000. The late Prof Jim McMurtry from the University of California, Riverside, USA, was a renowned taxonomist on especially predatory mytes, Phytoseiidae and known as 'the father of biological control of mite pests'. The editor of the journal Systematic and Applied Acarology, Dr Zhi-Qiang, established the award in 2018 to recognise a living acarologist who has made outstanding contributions to acarine systematics or applied acarology or both. It is awarded every four years, following nominations by fellow researchers.

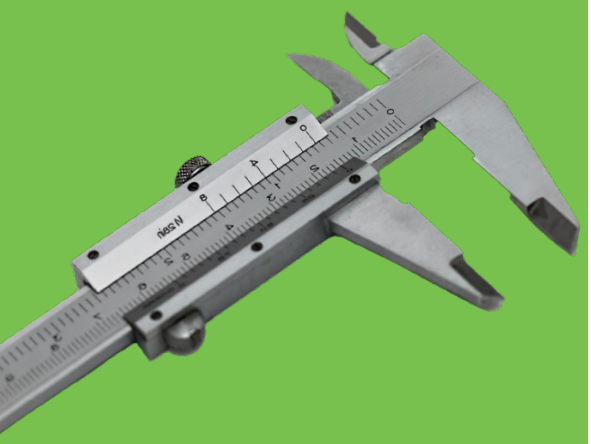
Prof Ueckermann is the second awardee of the prize, after already being nominated for it in 2018 by the late Prof Pieter Theron (UESM) and Prof Gilberto de Moraes from Brazil. Since the original nomination, his tally has risen to 26 genera and 286 species described in 245 publications.

The prize is to be awarded on December 2022 in New-Zeeland.

(View Prof Eddie's Biography, written by Prof Pieter Theron and Prof Gilberto de Moraes)

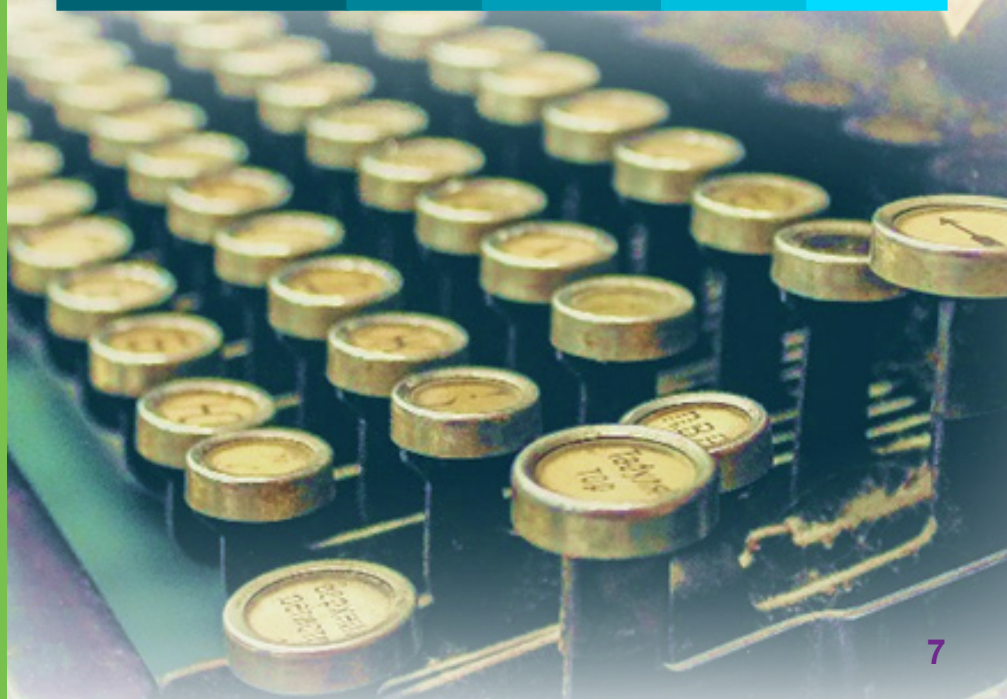
Sub-programme members in the UESM

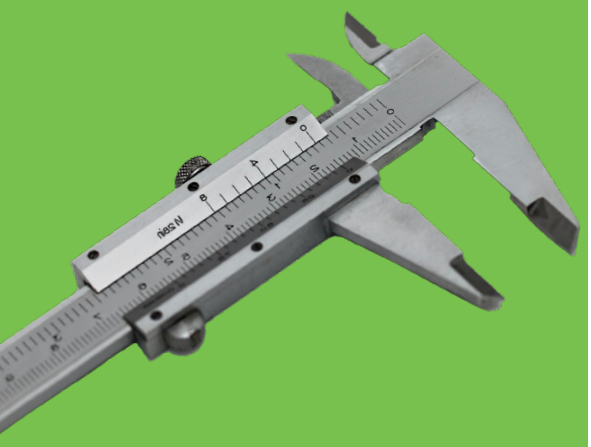
Sub-programme	Members	Doctorates	Professors	NRF Rated
Aquatic Ecosystem Health	12	12 (100%)	8 (67%)	6 (50%)
Biodiversity and Conservation Ecology	6	6 (100%)	3 (50%)	6 (100%)
Climate Change, Air Quality and Impacts	10	6 (60%)	3 (30%)	1 (10%)
Disaster Risk Studies	8	5 (63%)	2 (25%)	2 (25%)
Ecological Interactions and Ecosystem Resilience	21	15 (71%)	9 (43%)	9 (43%)
Environmental Management	11	6 (55%)	2 (18%)	4 (36%)
Integrated Pest Management	4	4 (100%)	4 (100%)	4 (100%)
Spatial Planning, Development and Implementation	5	3 (60%)	2 (40%)	1 (20%)
UESM	77	57 (74%)	33 (43%)	33 (43%)



Productivity is never an accident. It is always the result of a commitment to excellence, intelligent planning, and focussed effort.

Paul J. Meyer





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Paul J. Meyer

NRF-rated scientists in the UESM

NRF Rating	Member	Sub-programme
B1	Prof Johnnie van den Berg	IPM
B2	Prof Francois Retief	EM
B2	Prof Louis du Preez	BCE
B2	Prof Stuart Piketh	CCAQI
B3	Prof Dewald van Niekerk	DRS
B3	Prof Nico Smit	AEH
C1	Prof Ché Weldon	BCE
C1	Prof Driekie Fourie	IPM
C1	Prof Frank Neumann	EIER
C1	Prof Henk Bouwman	BCE
C1	Prof Sarel Cilliers	EIER
C1	Prof Stefan Siebert	EIER
C2	Dr George van Zijl	EIER
C2	Prof Ernst Drewes	SPDI
C2	Prof Frances Siebert	EIER
C2	Prof Hannalene du Plessis	IPM
C2	Prof Jonathan Taylor	AEH
C2	Prof Mark Maboeta	EIER
C2	Prof Oriel Thekisoe	IPM
C2	Prof Rasheed Adeleke	EIER
C2	Prof Rialet Pieters	AEH
C2	Prof Sandra Barnard	AEH
C2	Prof Sarina Claassens	EIER
C2	Prof Victor Wepener	AEH
C3	Prof Carlos Bezuidenhout	AEH
C3	Prof Klaus Kellner	EIER
Y1	Dr Courtney Cook	BCE
Y1	Dr Kerry Malherbe	BCE
Y2	Dr Christo Coetzee	DRS
Y2	Dr Dirk Cilliers	EM
Y2	Dr Madeleen Struwig	BCE
Y2	Dr Reece Alberts	EM
Y2	Dr Wynand Malherbe	EM

Professor Frank Neumann

Interview by Clarissa Minnaar

General

Where were you born and where did you grow up? Neumünster, in Northern Germany. I grew up in the Rhineland.

Can you tell us a little bit about your family? My wife is also a palaeontologist whom I met in South Africa at Wits University. She is a Turkish citizen from Istanbul. Our daughter is 10 years old and attending Potchefstroom Central School.

Do you have any pets? If so, what kind? We have an Irish Terrier (Molly), that we adopted from PAWS.

Do you practice any hobbies? If so, tell us a little more. I like everything science related. Especially when it's about geology and palaeontology. I like hiking and reading, especially fantasy, science fiction and historical novels. I'm also quite interested in history and politics in general.

How would you describe your day job to a child? I teach students how our planet was formed, how it changed over time, how we are affecting the planet and which resources we need from our planet. Apart from that, I conduct research on ancient pollen grains to try and reconstruct the environment over a long period.

Do you collect anything? Tell us more about your collections. I used to collect minerals and fossils. Unfortunately my collection had to stay behind in Germany when we moved to South Africa. We collect books as well. We have lots of books at home, including old geology and palaeontology books.

If you could choose a super-power, what would it be? Time travelling.

What's one thing you're currently trying to make a habit? I'm really trying hard to find a good way to ride my bicycle to the university. I haven't found a safe route from our home yet. Once I determine the best route, that would definitely be a habit I'd like to establish.

If you could meet one person, living or dead, and have a conversation with them, who would it be and what would you talk about? Alexander von Humboldt. He was one of the first geographers and, of course, Charles Darwin. Alexander von Humboldt was one of the first travellers in South America and I would love to know how he experienced travelling during that period, from the end of the 18th century until the beginning of the 19th century. It must have been marvellous to travel through the rain forest during that time. I would also like to speak to Charles Darwin about how he developed the ideas presented in his book Origin of Species.

What food have you tried that was the furthest out of your comfort zone? Mopane worms, although they're not so terrible, it's just the texture and the idea. I also had fried grasshoppers in Mexico. They were crispy and spicy, but not that bad either. I would probably do it again.

Career / NWU related

Where did you get your schooling? I studied at the University of Bonn in Germany where I completed my MSc and also first started working with pollen analysis. In Bonn, I also did my PhD on a core from a crater lake in the Golan Heights using pollen analysis and became interested in the vegetation history since the Chalcolithic until today. Thereafter, I started as a postdoc at the Hebrew University of Jerusalem and from there I came to South Africa. In South Africa I was appointed as a postdoc at the University of the Free State and then at Wits University. During my time at UFS and Wits, I got interested in the paleoecology of South Africa. I then spent around six years in Germany as an Assistant Professor whereafter I returned to South Africa.

Where were you working before you came to the NWU? I was working a Senior Researcher at the Evolutionary Science Institute at Wits University, from 2018 until the end of 2021.

How did you become interested in geology/palaeontology/palynology? My father had a cousin in Norway who

Favouities

Colour	**Purple**
Season	**Spring**
Place to eat	**Slouw Café**
Newspaper or blog	**Daily Maverick, Mail Guardian, News24**
Music genre	**SKA, rock**
Snack	**Chocolate**
Board/card game to play	**Strategy games, like Risk**
Fictional character	**Dr Strange**
Sport (to watch / to play)	**I like to watch Rugby. I do hiking and cycling**
Travel destination	**South Africa, but I would like to travel to New Zealand**

who was a school teacher. She has a very strong interest in minerals and fossils and Norway is very famous for its rock formations and mineral deposits. I suppose one might say she was a hobby geologist, but she definitely supported my already existing interest in geology.

Aside from ongoing research interests, have you recently gained any other special interests in science? My latest interests would be honey analysis and aerobiology. With honey analysis we test honey and from the pollen content in it, can tell where the honey comes from, for example, if it's South African honey or not. I also plan on continuing a project on aerobiology. With aerobiology we test the allergenic pollen spores in the atmosphere daily. Generally, spot traps are put up on roofs to collect the inflowing dust, including the allergenic pollen spores. From that we would be able to tell which allergenic pollen spores are in the atmosphere here in Potchefstroom and when. A Tunisian postdoc, Dorra Gharbi, will start working on that project in August. I also have quite an interest in coal geology and pollen analysis in Permian strata.

What was your first impression of the NWU when you got here? I love the town, since I'm not a fan of big cities. The campus is larger than I expected with lots of plants and, I particularly like the main building. Overall, it's a very open and friendly atmosphere. People here are more relaxed than in Jo'Burg.

What has surprised you most about working at the NWU? I appreciate the very organised way of teaching geology, especially since it's so closely linked to textbooks. I am impressed by the variety of topics we can offer in geology. The colleagues are all very young and enthusiastic. I also love the fact that we have a geological museum and a beautiful botanical garden. Furthermore, the NWU is the only institute I've ever seen world-wide (although there might be others) that combines geology with soil science. That allows us to even have links to fields like agriculture.

What is a common misunderstanding that people outside of the industry have when you tell them about your profession? Geology is often confused with geography. Palaeontology is often mixed up with archaeology. People are not aware of the distinctions between the fields.

This or that?

Morning person or a night owl	**Morning Person**
Biscuits or jellybeans	**Biscuits**
Visiting the future or past	**As a geologist, the past**
Flying cars, robot housekeepers, or moon cities	**Moon cities**
Messy or organized	**In-between**
Beer or wine	**Beer**
Sandals or sneakers	**Sneakers**
Travel by plane or car	**Plane**
Spicy or mild	**Spicy**
Horror film or comedy	**Horror film**

What are your hopes for the field of geology and/or associated fields at the NWU? We are quite strong in petrology, economic- and environmental geology and cover all the core geology disciplines plus soil science. I'm able to add palaeontology and we have a marine geologist, geochemist and micro-palaeontologist who joined us in June as Senior Lecturer (Eugene Bergh). We could build on micro-palaeontology soon, which has many economically important links. We also plan to strengthen coal geology and especially coal petrology here.

In short, what is the most exciting research project you are currently working / plan on working on in 2022? I was invited by German Archaeologists to visit an excavation site in Lebanon where the ancient Phoenicians lived. In collaboration with the archaeologists and other field experts I function as the palynologist. The area is completely new for me. I've worked in Israel a lot, but never in Lebanon. They have an ongoing excavation at a site called Tell el-Burak. I attended a field campaign there in June. During the field campaign I determined where I can withdraw sediment samples to test for pollen to help reconstruct those ancient environments.

If you could pick one field trip you went on, that you could relive again, which one would it be, and why? There was a student field trip to the Alps in the 1990's. We travelled throughout the Alps from Switzerland to Austria. There was a lot of walking and hiking up to great altitudes. It was one of the most inspiring, exhausting and interesting experiences I have ever had. Another field trip that I would like to redo was one to northern India up to the Himalayas - that was quite awesome.

What would you say are some of your strongest beliefs about geology and/or associated fields? It's important to understand our planet as a system. That everything is interlinked, and you cannot decouple processes. You should always understand them in connection to each other. For example, a sedimentologist should also be interested in climate and climate change over time because the sediments will reflect those environmental changes. Bearing in mind that earth is a system and thinking about the processes and how they interlink enables us to understand how we fit in and how we can impact Earth. It might also give us some ideas about possible solutions for problems like anthropogenic climate change.

What would you tell students who are considering a career in geology and/or associated fields? It's a wide field and probably one of the most versatile natural sciences. Geology is so closely linked to resources. Minerals, ores, plastics are all linked to geology. Geologists are the only natural scientists who integrate deep time as an element to their investigations.

Dr Sara Palacio to visit the NWU with EU-funded GYPWORLD team

Dr Sara Palacio in Spain, with her daughter, Nhaye, on her back.

GYPWORLD
A GLOBAL INICIATIVE TO UNDERSTAND GYPSUM ECOSYSTEM ECOLOGY

GeoEco

Dr Palacio, a tenured scientist from the Spanish Council of Research (CSIC), and a team of 15 international scientists will be visiting the GeoEco Lab of Prof Stefan Siebert in the Unit for Environmental Sciences and Management (UESM) during August and September 2022. This activity is part of an international collaborative network to strengthen research in gypsum ecology. The main aims of her visit are (1) a national workshop on gypsum ecosystems and (2) an expedition to the gypsum outcrops of South Africa and Namibia to extend our knowledge on the biodiversity of these unexplored areas. This expedition is funded by Dr Palacio and co-organised with Prof Siebert, and staff from the Gobabeb Namib Research Institute in Namibia.

Dr Palacio's research focuses on mechanisms displayed by plants to adjust their form and function to abiotic (climate, special substrates, fire, erosion) and biotic (herbivory) limitations of their environment. These adaptations help us to understand plant species responses to global change and its possible consequences on the functioning of ecosystems. In her research she uses a series of botanical, ecological, biochemical, molecular and ecophysiological tools to study processes at the level of the whole plant.

Her research on plants in extreme environments ranges from high mountain peaks to the driest deserts, with a special emphasis on atypical soils. As such, she is an international reference in the study of plants adapted to gypsum soils that are nutrient and water scarce, accumulates toxic substances (i.e. excess calcium and sulphate). Despite these limitations, gypsum ecosystems are home to a highly diversified flora, full of endemic species that have largely been understudied. Dr Palacio's research seeks to understand what mechanisms plants employ to grow in this limiting environment and how these processes have forged plant evolution. Answers to these questions can help combat desertification, improve crops in vulnerable areas of the planet and understand life in extreme conditions.

Dr Palacio has developed her research in ten countries and has organized and participated in biological expeditions on five continents. One of the most relevant results of her research is the discovery that plants can use the crystallized water in gypsum. This novel source of water for life holds important implications in exobiology. Her results have been included in more than 60 research papers, most of them published in international scientific journals, being works of high impact in their field. In 2016, she created and coordinated GYPNET, an international network for research dedicated to the study of gypsum ecosystems around the world. Since 2018, she has been the principal investigator of the European project H2020-MSCA-RISE GYPWORLD, aimed at studying global gypsum ecosystems, with a budget of €724,500 and 19 participating entities from 12 different countries, also including botany and microbiology staff from the UESM.

Newly Appointed Permanent Staff Members

The **School of Geo- and Spatial Sciences** would like to officially welcome the following permanent staff members:

Dr Eugene Bergh joined Geology as Senior Lecturer on 1 June 2022

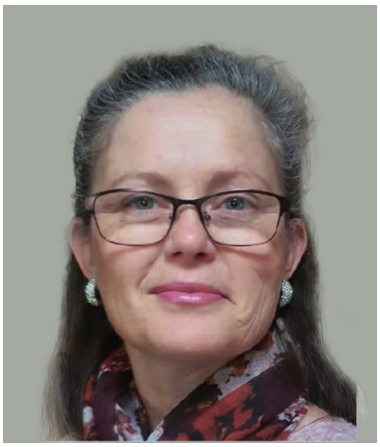
Ms Moteng Moseri joined Geology as Junior Lecturer on 1 June 2022

Mr Makatu Mashanyu joined Geology as Technical Assistant on 1 June 2022

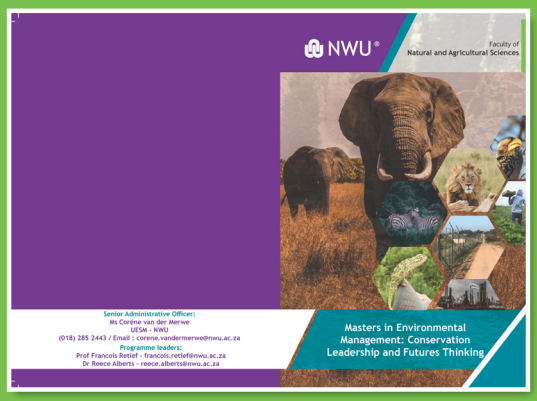
The **Unit for Environmental Sciences and Management** would like to officially welcome the following permanent staff members:

Ms Prudent Mokgokong joined the UESM as Junior Lecturer on 1 July 2022

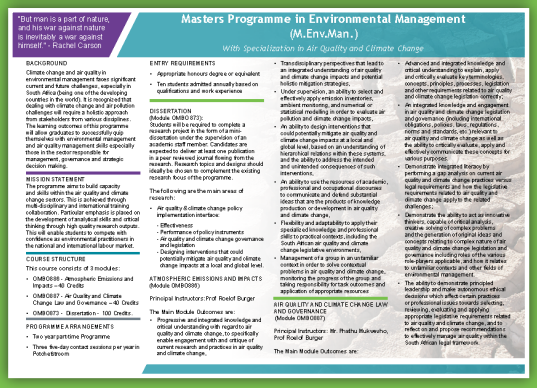
Ms Tsebo Mothibedi joined the UESM as Admin Assisstant on 1 July 2022



Ms Sarah Piketh joined the UESM as Senior Admin Assistant on 1 July 2022



MSc Environmental Management: Conservation Leadership and Futures Thinking brochure.



MSc Environmental Management: Air Quality and Climate Change brochure.

Insights into two new Environmental Management Masters programmes

Claudine Roos & Corene van der Merwe

The Environmental Management sub-programme identified the need for two additional Masters programmes that will commence in 2023.

Both programmes consist of:

- Two-year part-time programmes
- Three five-day contact sessions per year in Potchefstroom
- Three modules, two are taught modules and the third consists of a dissertation

Entry requirements are an appropriate honours degree.

Masters Environmental Management: Conservation Leadership and Futures Thinking

To better equip individuals working in the conservation sector with the required skills for addressing current conservation management and leadership challenges, the Conservation Leadership and Futures Thinking programme was developed. Conservation governance, -psychology, -ethics, -leadership and futures thinking form the building blocks of the programme. This programme will be led by Prof Francois Retief and Dr Reece Alberts.

Click here for more information on this course.
Click here to view a special video with stunning visuals and further information.

Masters Programme in Environmental Management with specialization in Air Quality and Climate Change

To better equip individuals with environmental management skills, a Masters programme with specialization in Air Quality and Climate Change was developed. This programme especially focusses on those individuals in the sector responsible for management, governance and strategic decision making.

In addition to a research project, a publication in a peer reviewed journal is expected through completion of the dissertation module. Other modules in this programme include Atmospheric Emissions and Impacts, and Air Quality and Climate Change Law and Governance. This programme is led by Prof Roelof Burger and Mr Phato Mukwevho.

Click here for more information on this course.
Click here to view a special video with stunning visuals and further information.

Hopping away on a wonderful “Frog Day”

Joretha du Buisson

When you combine the curiosity of young minds and the wonders of amphibians, you get a day WELL SPENT! On the 26th of February 2022, the African Amphibian Conservation Research Group (AACRG), in collaboration with *Nature I Am* and the Water Research Group (WRG), hosted the Potchefstroom “Frog Day” on the banks of the Mooi River. Children from all over Potchefstroom were eager to attend this fun-filled day to learn more about frogs and their habits. More than 120 excited little faces, between the ages of five and thirteen, joined us for games, puzzles and activities designed by *Nature I Am* specifically for this day. The activities included fun facts about South African frogs: how they jump, what and how they eat, their predators and their life cycle from a jelly-like egg, to a tadpole, to an adult frog. The highlight of the day was learning to jump and croak just like a frog alongside our very own Froggy Mascot. The curiosity and excitement of the kids to learn about our croaking friends were infectious, reminding us why we study these wonderful creatures. Spending time with nature and its inhabitants is a way to bring us closer as a community, and what a privilege it was to share it with all the little “tadpoles” of Potchefstroom.

We thank Prof Louis du Preez and Mrs Trudie Smit for organising the Frog Day and all the students from the AACRG and WRG that made the fun a reality.

Froggy Mascot: Hons. student, Tiaan Botha, greeted everyone with a hop and a smile.

Learning all about how the eye of the frog works by building a puzzle.

Sharing information on frog habitats.

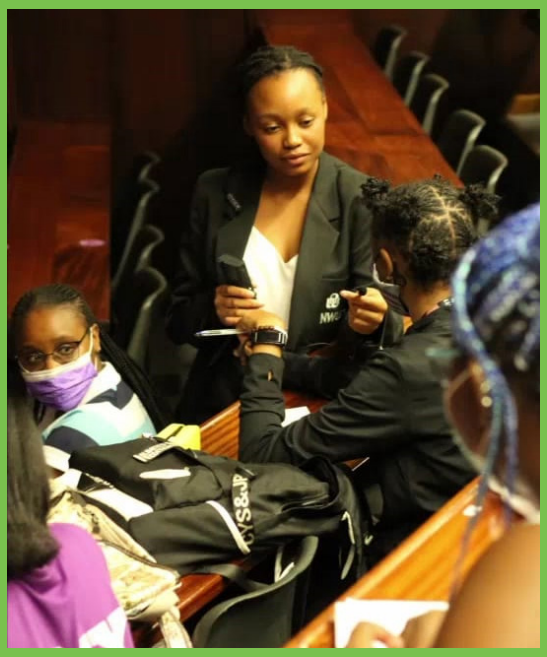
Matching the tennis ball to the frog environment.

Sago pudding - a yummy alternative to frog eggs.

Kids fascinated by the African Clawed Frog.

Puzzle-solving to get the frog away from predators!

AACRG and WRG members who made the day possible.



TED Talk for FNAS students.

Scavenger hunt.

Open Day.

Good-bye to the first semester

Krupa Daya
FNAS Chapter Chairperson

Just like that, the first half of the year has passed…

The semester has finally come to an end and most examinations have been completed. My sincere hope is that it went well with all the students' exams. Most returning and first-year students have had quite an uphill battle this semester. Fortunately, we are here to assist all students in achieving a balance in scheduling time off for themselves.

We've had a bunch of notable activities with students this semester, including a scavenger hunt, TED talks, and painting workshops (The Art of Expression). We also have upcoming events planned, such as academic seminars on specific occupations and information on issues that students are unfamiliar with (e.g., job opportunities and a glimpse into life after university). Another great initiative that has been in the works, is faculty merchandise, which we hope students were able to obtain. The biggest event is yet to happen - the formal dine - which is open to all students. This is the time to say bye to the sweats and hello to a side we haven't yet seen! Keep an eye out for dine information on our social media.

Lastly, I would like to take this opportunity to thank all the students and professors who assisted and supported us as SAC during our first semester. I am sincerely appreciative to everyone who came out to events, donated for canned food day, or simply stopped by the office to say hello. This term would not have been possible without the committee that has stood alongside me. Thank you for all the hard work and effort that you have put into making our events a great success.

Looking forward to the second semester.

SAC:FNAS committee 2021/22.

Reflecting on the First Semester

Future Ecosystems for Africa Workshop: Changing the future of Africa! Using Nature Based Solutions for sustainable development

Elaine Sooten
Forb Ecology Research Group (FERG)

Africa is most renowned for its unique and incredible diversity of cultures, landscapes, fauna and flora, and many more attributes that make you stop and go 'Wow'. In an effort to preserve this diversity for current and future generations, a flagship program called the Future Ecosystems for Africa (FEFA), funded by the Oppenheimer Generations Research and Conservation (OGRE) was initiated in 2021, and launched in April 2022. The program is led by the Global Change Institute and the School of Animal, Plant and Environmental Sciences at Wits University with several other collaborators from Africa, and researchers studying African ecosystems. Prof Frances Siebert and two MSc students (Elaine Slooten and Eulalia Jordaan) of the Forb Ecology Research Group (FERG) have been included as South African research collaborators in the FEFA program. From 10–13 April 2022, the FERG team attended the program planning workshop at Telperion Nature Reserve in Mpumalanga under soaking wet weather conditions. Still, the beautiful landscapes of the Rocky Highveld Grasslands did not disappoint, and it was a privilege to learn from and share ideas with fellow students and researchers from, amongst others, Kenya, Zimbabwe and Exeter University in the UK.

FEFA presents a unique opportunity to guide the development of nature-supporting or nature-based solutions (NBS), rather than following nature-eroding paths. FEFA's aim is to strengthen the evidence describing ecosystem dynamics and identifying tipping points in ecosystem function in a way that captures the priorities and experience of African people. With this in mind, the program takes a transdisciplinary approach that recognises the value of indigenous and local knowledge systems, and strives to embed a post-colonial agenda in its praxis.

Within the broader FEFA program, the MSc research of Elaine and Eulalia will form part of the Work Package (led by Prof Sally Archibald (Wits) and Prof Frances Siebert), which is aimed at conducting field assessments to quantify the rate of recovery post-transformation (specifically ploughing in agricultural landscapes) in terms of species composition and functional diversity, and in terms of soil- and plant carbon.

We are excited and feel privileged to be part of this program!

See the FEFA website here.

Group photo of FEFA workshop participants

Reflecting on the First Semester

FERG attends first in-person Savanna Science Network Meeting after COVID-19

Tsumbedzo Ramalevha & Wynand Muller
Forb Ecology Research Group (FERG)

The 19th Savanna Science Network Meeting (SSNM) took place from 6 - 10 March 2022 in the Nombolo Mdhluli Conference Centre at the Skukuza Tourist Camp, Kruger National Park. This was the first in-person SSNM conference since the Covid-19 pandemic.

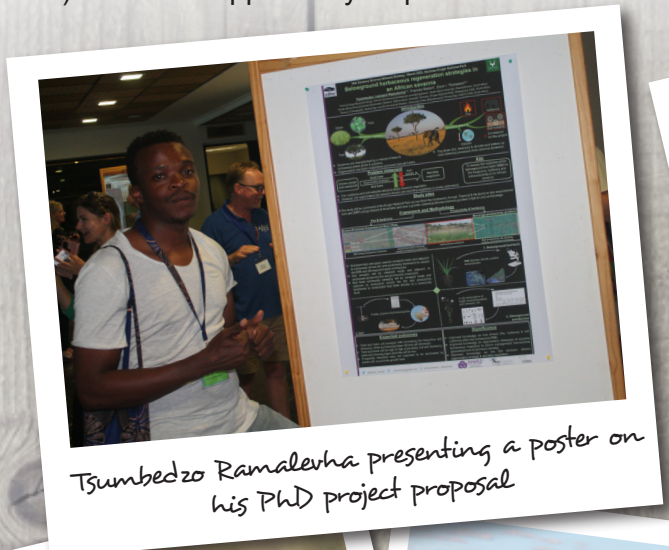
The SSNM was initiated to provide a platform for local- and international scientists and students to present their research- or planned research projects conducted in National Parks of South Africa (SANParks). It has since expanded across international borders to include prresentations on research findings from savanna and grassland ecosystems across the globe. It's an incredible opportunity to engage with leading grassy ecosystem scientists and postgraduate students on relevant research topics. Students gain access to networking opportunities that aid in the understanding of open ecosystem research and conservation.

Four students from the Forb Ecology Research Group (FERG) - Tsumbedzo Ramalevha (PhD), Wynand Muller (MSc), Elaine Slooten (MSc) and Yani Steyn (Hons) - had the opportunity to present their research at this year's Network Meeting. Tsumbedzo presented his research on belowground herbaceous regeneration strategies in African savannas, while Wynand showcased his project on linking butterfly diversity to forb community responses to fire. Prof Frances Siebert and Elaine Slooten was invited to join a workshop on Nature-Based Solutions for carbon sequestration in Open Ecosystems, while Yani Steyn was exposed to expert knowledge on fire ecology to boost her project on the interactions between fire and healthy seed banks.

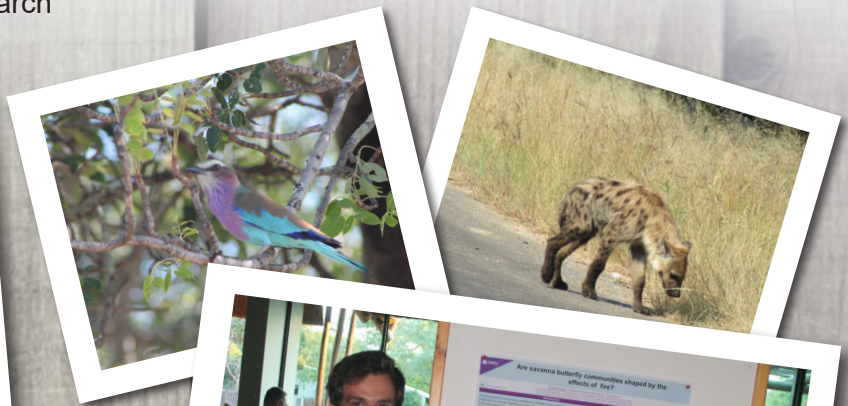
The conference provided a comprehensive, high-quality scientific programme with sessions ranging from climate change to below-ground patterns and processes.

Discussing projects and academic interests with such a diverse audience, and highlighting our own research done as members of FERG was an invaluable and inspiring experience.

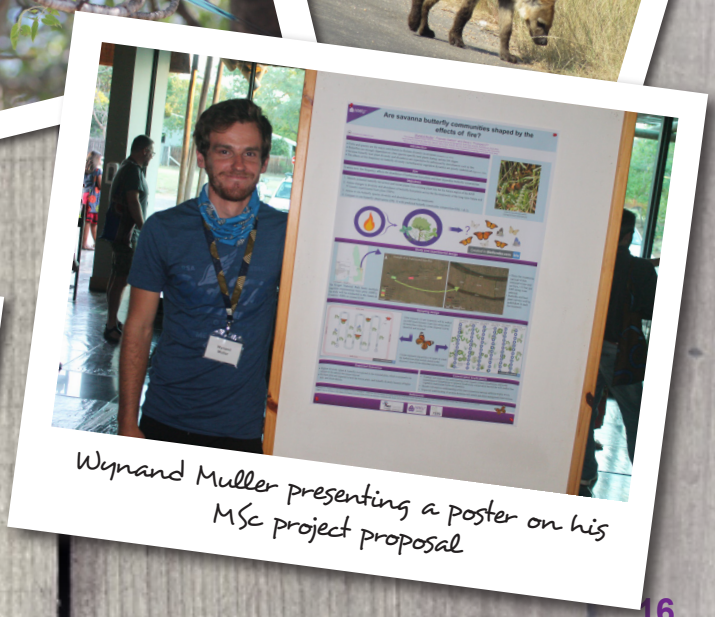
For further information on the Forb Ecology Research Group activities and projects, you can follow us on Twitter and Instagram, and like us on Facebook.



Tsumbedzo Ramalevha presenting a poster on his PhD project proposal



Photos by Elaine Slooten



Wynand Muller presenting a poster on his MSc project proposal

Reflecting on the First Semester

Strengthening collaboration: Protected Areas research in Namibia

Francois Retief & Claudine Roos
Protected Areas Research Group (PARG)

Namibia is one of the countries with the highest percentage of total land surface under formal conservation and is known for its conservancies and open system approach to conservation. It was therefore a great opportunity for the Protected Areas Research Group (PARG) when invited by Prof Morgan Hauptfleisch from the Namibian University of Science and Technology (NUST) to visit Namibia during April 2022. The research visit aimed at strengthening research collaboration, specifically focusing on i) waste management in protected areas; ii) implications of different environmental governance arrangements for conservation and ii) the identification of future scenarios and risks for protected areas ("futures thinking"). The trip included a visit to the impressive Gobabeb Research Institute and the Etosha Ecological Institute, as well as Sesriem and Sossusvlei, and the NamibRand- and Etosha Heights Private Nature Reserves. We had the opportunity to meet with key individuals at these institutes and reserves and were surprised to run into fellow UESM colleagues at Gobabeb, namely Professors Stuart Piketh and Carlos Bezuidenhout – it seems like UESM researchers are everywhere! The team also had productive meetings with the Namibia Ministry of Environment and Tourism, and NUST colleagues and students and even had our voices heard on Namibia's Kosmos Radio.

Listen to the short interviews with Prof Francois Retief (https://iono.fm/e/1177534) and Dr Claudine Roos (https://iono.fm/e/1176567).

The visit provided an opportunity to share learning between the South African and Namibian conservation contexts. In particular, recent PARG research on waste management at Sabi Sand Wildtuin was compared with waste management initiatives at Namibrand and Etosha Heights private nature reserves. The experience confirmed that effective waste management remains an elusive key issue for privately protected areas, especially those catering for the higher end tourism market. Prof Hauptfleisch and his colleagues also shared their extensive and growing Namibian

The team at Etosha Heights Private Nature Reserve

At the Etosha Ecological Institute

animal tracking database, especially for elephants. This database makes it possible to start comparing animal behaviour in open ecological systems across different environmental governance systems and land uses (national parks, conservancies, commercial agriculture). The initial patterns seem to suggest that different governance options not only affect human behaviour as we know, but also animal behaviour. In this regard the choice and combination of governance arrangements need to be carefully considered to positively support system functioning at a landscape scale. PARG is currently working on a paper in close collaboration with NUST, which aims to map the efficacy of different environmental management approaches to elephant conservation in Namibia. During the visit interviews based on futures thinking methodology were also conducted with Park Managers and Scientific Heads, about their perspectives on the future of conservation in Namib Naukluft and Etosha National Parks respectively. The outcome of the interviews will form part of similar research conducted in South African protected areas. In a next step to strengthen collaboration, a joint research symposium is planned between NWU and NUST for March 2023 at Gobabeb Research Institute.

PARG with Prof Morgan Hauptfleisch at NUST. (From left: Prof Dirk Cilliers, Prof Morgan Hauptfleisch, Dr Reece Alberts, Dr Claudine Roos and Prof Francois Retief)

Visiting the Gobabeb Research Institute with its magnificent red dunes

Visiting the Gobabeb Research Institute

Reflecting on the First Semester

Lichens – from the Sand to the Sea

Sarina Claassens
Soil Ecology, Ecotoxicology & Microbiology (SEEM)

It is not often that the stars or the diaries of numerous scientists align so that they can all be in one spectacular place at the same time. In April of this year, myself and Stefan Siebert were among a select group of 20 scientists from eight countries that had the opportunity to experience the Namib Desert on a research expedition unlike any other. Not only is the environment unique and enlightening, but we were also in excellent company with some of the top South African (NRF A-rated) and highly experienced international researchers.

Our base for the expedition was Gobabeb Namib Research Institute, located in the Namib Desert between the Sand Sea, gravel plains and riparian woodlands of the ephemeral Kuiseb River (www.gobabeb.org). From here our NWU contingent travelled daily to surrounding sites to sample biological soil crusts of gypsum soil and observe lichens along a fog gradient starting at the coast and stretching inland (lots of sunscreen and water were consumed!). Biological soil crusts are found in semi-arid and arid environments and are cryptogamic communities of different organisms that live on the soil surface and perform important ecological functions. Lichens are the most predominant producers in these ecosystems. They represent communities of different organisms and are often described as composite organisms that arise from algae or cyanobacteria that live in mutualistic relationships with multiple fungi. The (often hidden) diversity of this hyper-arid desert is stunning and the gypsum ecosystems encountered here hold secrets just waiting to be discovered.

We were also fortunate to visit Welwitschia fields, see the wonderful geological formations at Mirabib and camp under the stars in the Sand Sea. Evenings were spent sharing ideas for research, future collaborations and plans for our next Namibian expedition. A very productive and enjoyable week was had by all involved.

In August of this year, we will travel to Namibia again as hosts for a contingent of 20 international scientists from Spain and Italy as part of the global GYPWORLD initiative (Gypworld.com – A Global initiative to understand gypsum ecosystem ecology). The aim of this expedition, funded by the European Union, is to gather data on a range of environmental and biological variables of gypsum ecosystems in southern Africa. This is part of a larger integrated global study of the ecology and evolution of plant and lichen life on gypsum, which includes eight gypsum-rich regions from four continents that differ in geological origin, climate, and flora.

Photos by Sarina Claassens

Potentially sacrificing human and environmental health for food security

Lohan Bredenhann, Rialet Pieters & Suranie Horn
Envitrox

South Africa produces 10–20 million metric tons of maize annually, all treated with agrochemicals, a critical component of food security. These agrochemicals inevitably end up in non-targeted areas of the environment and may pose health risks to humans and animals. Roundup® is one of the most commonly used herbicides in the world. It contains the active ingredient glyphosate (GLY) which inhibits an enzyme in the shikimate pathway found in plants, ultimately leading to plant death. Glyphosate-tolerant crops were developed, which meant that farmers could increase their glyphosate-use without harming the crops. Unfortunately, this also led to the surrounding weeds developing resistance against glyphosate. To fight resistance, pesticides with other mechanisms of action are now used in combination with glyphosate.

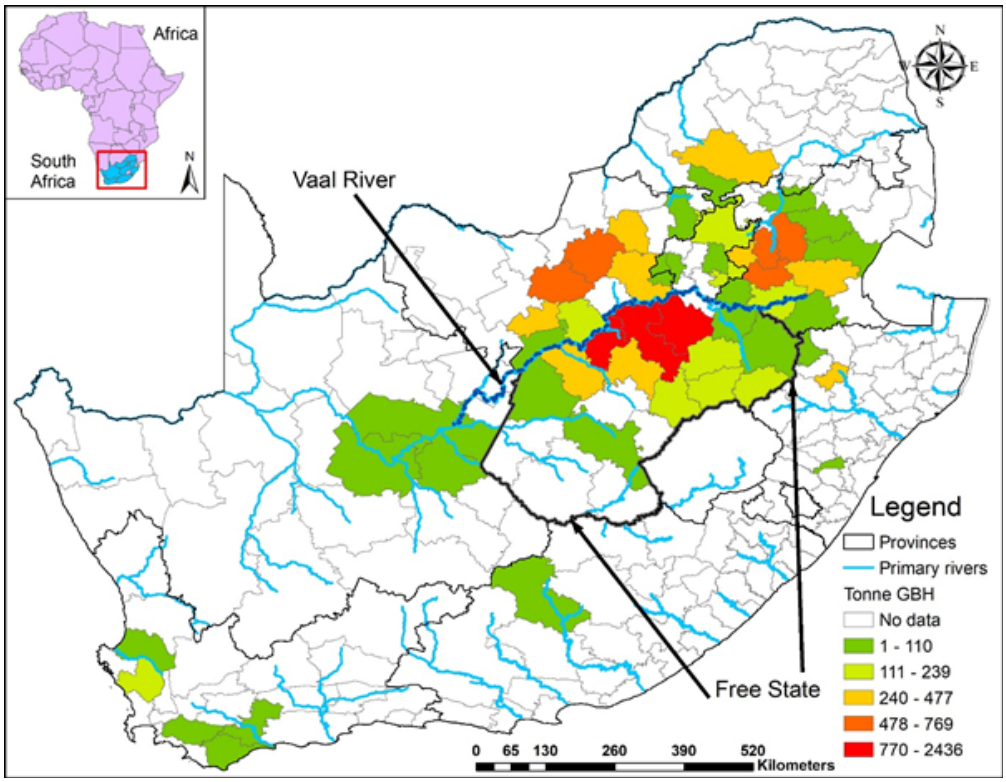


Figure 1: For the 2017 season, the application of glyphosate-based herbicides (GBHs) on maize, soybean, wheat, and sunflower crops in the municipal districts of South Africa (in tonnes a.i./ha). The WGS 1984 geographical coordinate system was used to project the vector data set coordinates (in decimal degrees) to show where the chemicals were used.

The last study published on general pesticide use in SA was in 2015, using data from 2009. In a recent study, data from 2017 showed the volumes of glyphosate-based herbicides (GBHs) applied to only four crops (i.e., maize, soybean, wheat and sunflower), which made up 80% of the total GBH applications. In 2009, the GBH application was approximated at 3 721 tonnes for all crops. However, in 2017 (eight years later), the amount had doubled to approximately 7 977 tonnes for use on only these four crops. The region with the highest GBH application (1 391–2 436 tonnes) was the Free State Province bordering the Vaal River between Vereeniging and Bloemhof (Figure 1). Most farmers in this region grow maize and/or soybeans and utilize conventional agricultural strategies when rotating their maize or soybean crops with a cover crop (e.g., replacing maize with legumes or soybean with wheat). Farmers spray herbicides on their cash crops before switching to another cover crop, which may also be sprayed with GBH, resulting in continuous herbicide use in these areas throughout the planting season.

Global GLY application for all uses—agricultural and non-agricultural—has increased more than 12 times in the last two decades, from 67 000 tonnes in 1995 to 826 000 tonnes in 2014. Studies done all over the world, e.g. Argentina, United States, Canada, Spain, Germany, Sri Lanka and New Zealand, have contributed to current knowledge that GLY and its main metabolite, AMPA, occur in the natural environment. Regrettably, there are no studies done on the GLY and AMPA concentration levels in SA, and subsequently no laboratory or agency in the country to analyse or monitor these chemicals in the environment and hence a lack of official regulatory guidelines for the levels of these harmful chemicals in soil or water. As a country we aim to encourage food security by reducing crop loss with GBHs, but to what extent will we be polluting our environment and consuming poisoned food, before any effective action is taken?

Capers on coral reef islands: Part 4 Lamu Island: Where time stood still

Henk Bouwman

On the north coast of Kenya, against the border of Somalia, are the two islands of Lamu and Manda, separated from the mainland by narrow tidal lagoons. I heard some stories about this place, especially its birding, and decided that I will visit, after attending a conference in Mombasa in 1998. In a single-engine aircraft and with a couple of other passengers, we followed the coast north-east, getting breath-taking views of the coral and sandy shores of Kenya. I had the co-pilot's seat with stunning views. The Lamu airport terminal was an open thatched structure. Thereafter, you grab a water taxi to the town of Lamu.

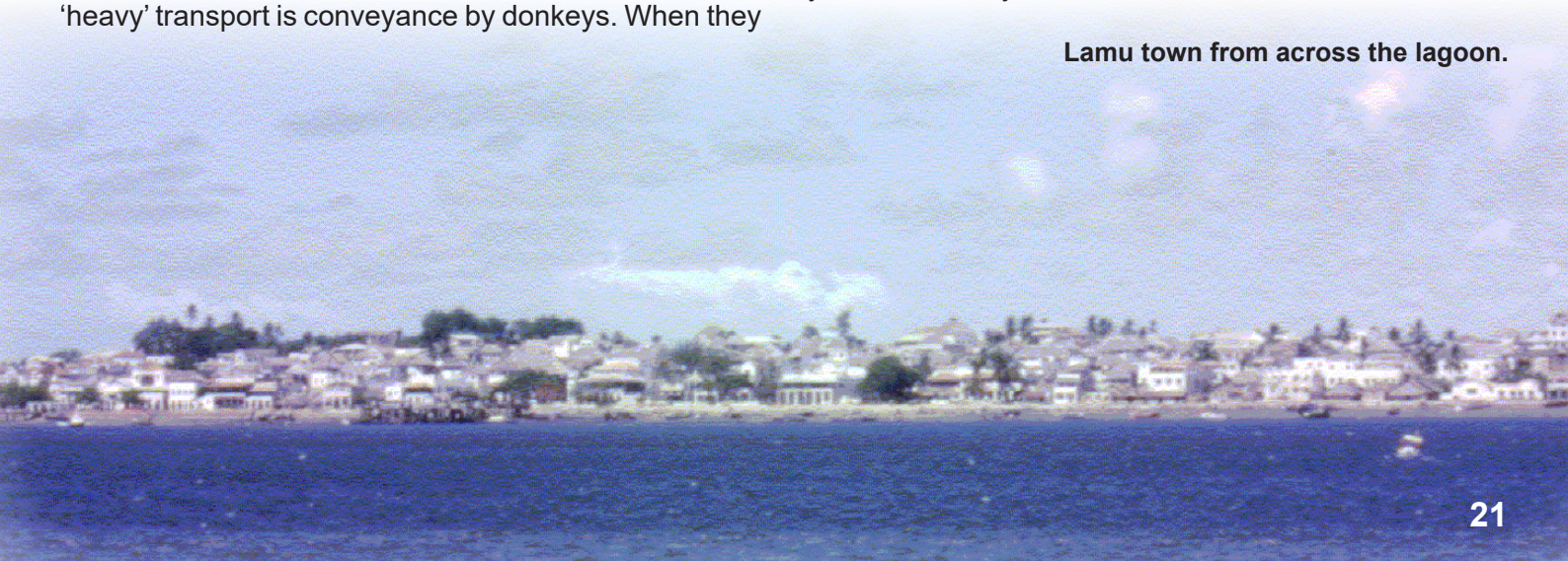
On the way to Lamu, flying over beautiful beaches and coral reefs.

Lamu was a town where time stood still. It used to be a slave-trading town and it has its very own museum. There was a single road, about 200 m in length when I was there, and only the mayor had a car with a chauffeur. Between the tall narrow houses, the walkways are very narrow (1-2 m). The only mode of 'heavy' transport is conveyance by donkeys. When they

Lamu town, with tall houses and narrow streets.

clatter down the alleyways, you better get your feet out of the way or you'll end up with throbbing toes. Getting to the guesthouse was easy the first time round with some help, and afterwards you were left alone. My room was on the fourth floor, with no glass windows, no electricity, and no hot water. Lamu is a hot place, so no hot water needed, and candles will do for lighting. The rooms face towards the sea (east) so the sea breeze through the open windows keeps the mosquitos at bay and temperatures semi-tolerable. Sunrise was over my shoulder and some of my best scientific reading ever was done in this wonderful light. The dining area is open and on the top floor, as with all the other houses. In the cool breeze of the evening, you can chat with the neighbours and enjoy the lovely vistas and sounds of the town. Alcohol was almost impossible to get, but there was a small opening in a wall in a dark alley where you stick money in, and beers come out.

Lamu town from across the lagoon.



Lamu is an island and had no crime. You can get lost, but people recognise you and point you in the right direction. Otherwise, you keep getting lost until you get un-lost. Restaurants along the fishing harbour wall are small, crowded, but full of atmosphere. Food is good. I loved the shrimp sandwiches.

The other town on the island, Shela, is 2.5 km south of Lamu. It can only be reached by boat or at low tide along the beach. There was bad blood between the two metropoles, and they used to have regular wars during low tide. I did lots of birding on the battlefields.

A dow, slow, steady, yet graceful.

Most of the shipping was by dow. These single-mast wooden boats, each built by hand, were marvellous to see. I heard about Captain Tarzan and chartered my own private 'yacht' for a day. I had to board just after midnight because dows are slow, and you need time and wind to get anywhere. We cruised along the shores and lagoons, me marvelling at the scenery and studying the wildlife. We gave lifts for two families that needed transport with my permission, and I had nice chats with them all. I was taken to a village where the chief entertained me and some of the women wove me a basket.

I spotted a very nice deserted beach. We pulled up, the crew went to sleep, and I had my own private beach with swimming, birding, walking, and just enjoying (called scientific exploration). A visit to the local quarry showed me how the local bricks were made. They were hewn out of the fossil coral by axe, and much of Lamu and Shela were built with this.

Hewing bricks from fossil coral. Most of the structures in Lamu are built from this.

Time to sail home. Except, you need wind. We drifted…. and drifted…until dark when it started to rain. Eventually, we fetched home after midnight. All restaurants were open—it seems they *never* close—and kids were still running around. Soaking wet I had a cold beer (or two), a good meal, and lovely chatting to locals and tourists alike. When time stands still, it really stands still…

I loved Lamu, one of the best times on any island for me. Biologically, it is at the northern end of the East African Coastal Forests bioregion that starts in Somalia, and ends in KwaZulu-Natal, sharing a rich biodiversity, especially birds, and which I had the privilege to study at both ends.

PS: Lamu became a Unesco World Heritage Site in 2001. Lamu has seen its share of terrorism and conflict as it is close to Somalia. A harbour development is underway, the conflicts remain a nuisance, but visiting seems safe.

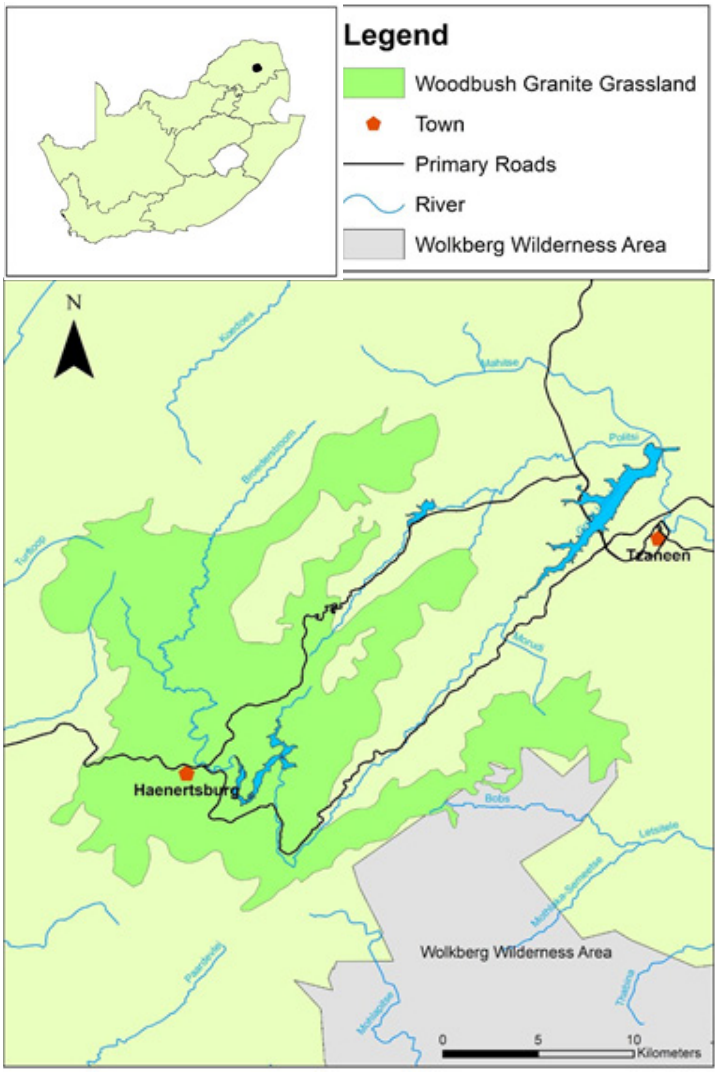
My own 'private' beach in Lamu.

Wolkberg wonders: Endangered butterfly species of the threatened Woodbush Granite Grassland

Marlize Muller & Wynand Muller

Forb Ecology Research Group (FERG)

In the Limpopo Province of South Africa, nestled among pine plantations on the R71 road between Polokwane and Tzaneen en route to the Kruger National Park you will find a small village called Haenertsburg. This village is next to the largest remaining remnant (~192 ha) of the critically threatened Woodbush Granite Grassland (WGG), home to around 661 plant species, 237 birds, 62 mammals, 38 reptiles, 11 amphibians and an unknown number of invertebrate species (Niemandt & Greve, 2016). Some of these invertebrate species are butterflies, including the Wolkberg widow (*Dingana clara*), the Wolkberg blue (*Orachrysops regalis*), the Wolkberg russet (*Aloeides stevensoni*) and the Wolkberg Zulu (*Alaena margaritacea*). The Wolkberg widow, Wolkberg russet and Wolkberg Zulu are endemic to the WGG and will likely go extinct if the WGG disappears.



The location of the Woodbush Granite Grassland in the Limpopo province, South Africa. Map by Wynand Muller.

The Wolkberg widow underside (A) and upperside (B).

The Wolkberg Widow is classified as endangered as its distribution is limited to only the Wolkberg area of Limpopo. The species has a shiny slate brown/ground colour with orange and black markings on both sets of wing edges and a size ranging from 56 mm to 65 mm. They have a sailing/fluttering flight pattern low to the ground among bushes and rocks and their preferred habitat is on rocky slopes among protea bushes.

The male Wolkberg russet underside (A), upperside (B) and side view (C).

The Wolkberg russet has been declared critically endangered as only a few colonies are known to exist. However, a new site, where the Wolkberg russet seems to flourish, was discovered in 2019, namely in the Bewaarskloof Reserve (Terblanche, 2020). The species has a velvety brown colour with pale markings/spots on its dorsal side, while the underside is lighter in colour with more distinct markings/spots and a distinctive orange patch under the forewing. Their size ranges from 56 mm to 65 mm and they prefer to fly low and slow near the ground in large colonies.

The upper side of a Wolkberg Zulu, note the bars clearly visible on their antennae.

The Wolkberg Zulu has a beautiful mix of burnt orange and black markings while its underside is white with a netted black pattern. Their size is in the range of 24-30 mm. The species is under threat from alien tree plantations and is critically endangered. Eggs are laid on rocks or on the ground, the larvae are hairy, slug-shaped, well camouflaged and feed on cyanobacteria. The pupae are also hairy and hidden in rock crevices and leaf debris.

For these three butterfly species, the plants they are dependent upon for food (larval and adult) are not yet fully known. There is therefore much to still learn about these species before the grassland system is lost due to silviculture, urban development (Niemandt & Greve, 2016) or bush encroachment from the adjacent savanna biome. Two trusts are working to conserve these three butterfly populations, namely the Brenton Blue Trust and the Endangered Wildlife Trust (EWT). There is also a volunteer group, Friends of the Haenertsburg Grasslands (FroHG) that actively works to conserve the grassland. Anyone can become a member of these groups to promote the conservation of some of the most threatened ecosystems and species.

Next time you are visiting the Haenertsburg-Magoebaskloof area, be sure to go on the Louis Changuion hiking trail and try to spot some of these endangered butterflies in Limpopo's most threatened ecosystem!

All species descriptions were obtained from Woodhall, 2020.

Acknowledgements

Many thanks to Etienne Terblanche, "An African Butterfly Guy" for his expertise on the butterflies of the Haenertsburg area, his photos and his great love and passion for butterflies.

Regenerative agriculture: Can it restore our degraded soils?

Gerhard Du Preez
AgroBiology

For decades farmers have relied on tillage and agrochemicals (i.e., fertilisers and pesticides) to prepare seedbeds, control pests, and ultimately achieve maximum crop yields. As a result, most of South Africa's cropland soils are severely degraded, just dirt. Farmers, therefore, turn towards regenerative agriculture (RA) to restore soils. The principles of RA include minimal tillage, permanent soil cover with organic material, and diversification through crop rotation. Additionally, livestock often grazes multi-species cover crops when planted in rotation with cash crops. By building healthier soils, farmers can promote soil fertility and disease suppressiveness. Regenerative-based systems are also more resilient against climatic events (e.g., droughts).

Livestock grazing on cover crops (research trial).

Once a farmer transitions from conventional agriculture to RA, a soil health assessment framework can be used to monitor progress in restoring degraded soils. However, these frameworks place minimal emphasis on soil ecosystem status. This, even though ecosystem health and functioning facilitate nutrient cycling, carbon sequestration, structure maintenance, and water regulation, which represent foundational processes of healthy soil.

Since 2019 our team at the NWU has been investigating the potential of RA to restore the health and functioning of soil ecosystems. The MSc research by Ané Loggenberg formed part of our first RA project. The work by Ané revealed that farmlands in the Vrede

Tiller raddish (cover crop).

area (Eastern Free State) shifted from degraded and nutrient-depleted to mature and fertile systems (Figure 1) in less than seven years after conversion to RA. Being classified as mature and fertile suggests a sufficient flow of energy between trophic levels in the soil, thus promoting essential ecosystem functions such as nutrient cycling. Maturity also reflects the presence of higher-level trophic organisms, including omnivores and predators, which can aid in the suppression of crop pests and diseases. Also of interest is the evidenced link between active carbon (fraction of carbon readily available as a food source) and microbial activity, confirming that healthier soils are more likely to sustain ecosystem functioning.

These results represent only the beginning of our work on the ecological restoration of agroecosystems at the NWU. Ongoing research projects focus on edaphic and climatic conditions, the potential impact of crop diversification, and the influence of specific treatments

(e.g., organic amendments and bio-stimulants) and practices (e.g., livestock integration) on the restorative potential of RA. Globally, the necessity to farm more sustainably and create more robust and resilient agroecosystems is increasingly evident. The ultimate goal of our research group is to support producers in making the right management decisions and ultimately promote environmental health, economic prosperity, and food security.

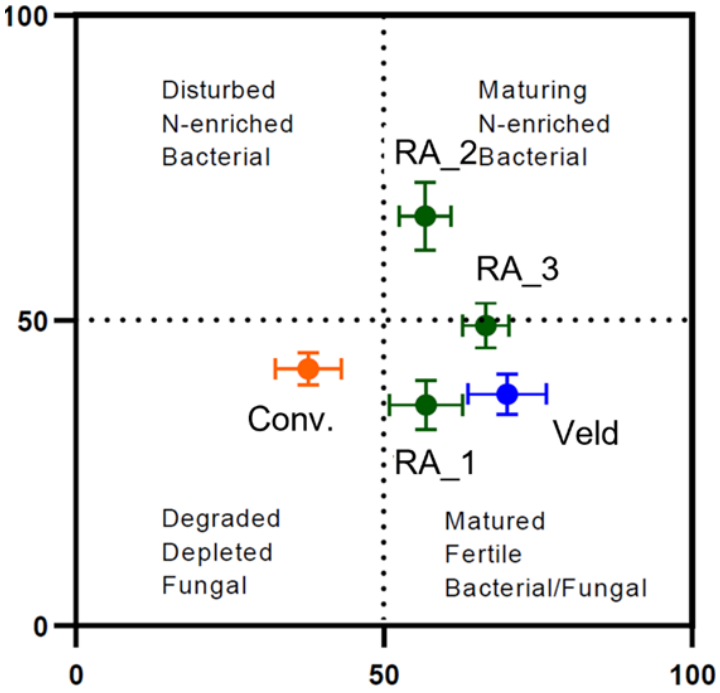


Figure 1: A nematode-based analysis indicating the food web status of regenerative agriculture (RA) farmlands and two reference sites, namely a conventional farmland (Conv) and natural veld (Veld), at the Goedgedacht farm in the Eastern Free State.

Cover crop mixture.

Disasters are never "natural"

Dewald van Niekerk & Livhuwani Nemakonde

(This article is based on two opinion pieces submitted to News24 by the authors)

The recent floods in KwaZulu-Natal (KZN) are a stark reminder that humans and nature are intertwined. The floods and their impacts provide an opportunity to self-reflect and ultimately self-correct. Self-reflection is generally uncommon in the government and the blame for such events is often pinned on climate change and nature, labelling the floods "natural disasters". Accusing nature is a convenient way of absconding any responsibility. Such a belief shows a very narrow understanding of how disasters and disaster risks are created, and it leaves us powerless in the face of increasing natural phenomena.

Devastating landslides resulting from flooding in KZN, leaving many people homeless - Getaway.

Flooding in KZN is an annual occurrence

Flooding, and the subsequent loss of lives and property in KZN is also not something new, and has become an annual occurrence. Yet, we need to question this recurring event. We need to look beyond the natural hazards we face and understand the underlying risk drivers, exposure of people and infrastructure, and vulnerability. Decades of research into disasters and risks by the academic fraternity clearly shows that in most, if not all, cases it is these underlying risk drivers which are to blame. All these drivers are within the control of human beings. As these floods once again showed, it is primarily the poorest of the poor who are disproportionately affected.

The South African government and the KZN province has failed in its obligation to ensure a healthy and secure environment for all our people as promised in the Constitution. The government has failed in implementing and monitoring its own development- and disaster management laws and policies. Unemployment, poverty, inequality, corruption, uncontrollable urbanisation, poor urban planning and haphazard development, inadequate robust public infrastructure, little to no maintenance of green- and other infrastructure, questionable housing construction and enforcing of building codes, absence of disaster risk reduction, settling on marginal land including slopes (because people have no other choice), destroying wetland and estuaries, removing vegetation in landslide prone areas, poor disaster preparedness, are some of these underlying drivers and risk creators.

A ravine opened beneath an neighbourhood in Umdloti, north of Durban, one of the hardest-hit towns, in flooding on April 12 2022 - SowetanLIVE.

What about climate change?

Climate change is widely cited for influencing weather patterns and exacerbating the frequency and intensity of hydro- and meteorological hazards. There is enough scientific evidence that supports this argument. The recent IPCC Six Assessment Report reiterates that, which we have known for years – climate impacts are on the rise, and we are reaching (or have reached)

a no-return tipping point. The coalescence of already vulnerable elements (including people and infrastructure) being exposed to the hazards, and the insufficient capacity to cope with hazardous events, lead to the adverse effects of disasters in South Africa, and everywhere else in the world. In this regard, vulnerability factors, and not the hazard (floods in this case), play a major role in the impact of disasters. Therefore, blaming climate change for the impacts of the KZN floods is disingenuous and a misdiagnosis of the problem.

Desperate need for essentials after floods in KZN caused serious damage to property and left many homeless - Freightnews.co.za.

Vulnerable and poor exposed

In turn, they expose the most vulnerable and poor to the wrath of natural hazards. Combine the above in a dysfunctional province rife with petty party politics and internal factional fighting, and the human cause of this disaster is abundantly clear. Until there is a realisation and acknowledgement that we are the creators of disaster risk and that disasters are the making of human beings, we will continue to see disasters of this magnitude (and even worse) for years to come. Disasters are not natural.

Overflowing river resulting in hundreds of shacks damaged due to floods in Durban - IOL.

SCIENCE FACT BOX

Bees as skilled mathematicians

Aging secrets in reptiles & amphibians

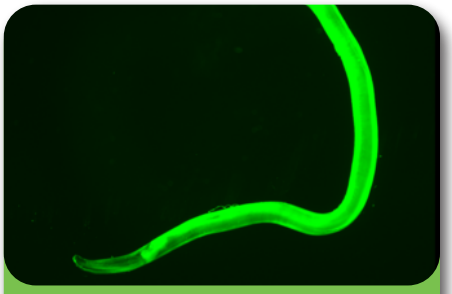
New Record: Largest Bacterium

Pipeline boosts sea-floor animals

Image source

Shot hole borer invades SA

Endangered sharks in petfood



Cancer research: Custom suits for worms

Climate refuge for hummingbirds

Octopus- & Human Brain 'jumping genes'

First plants grown in moon dirt

Glowing spider fossils & algal goo

Wellbeing: Colourful urban environments

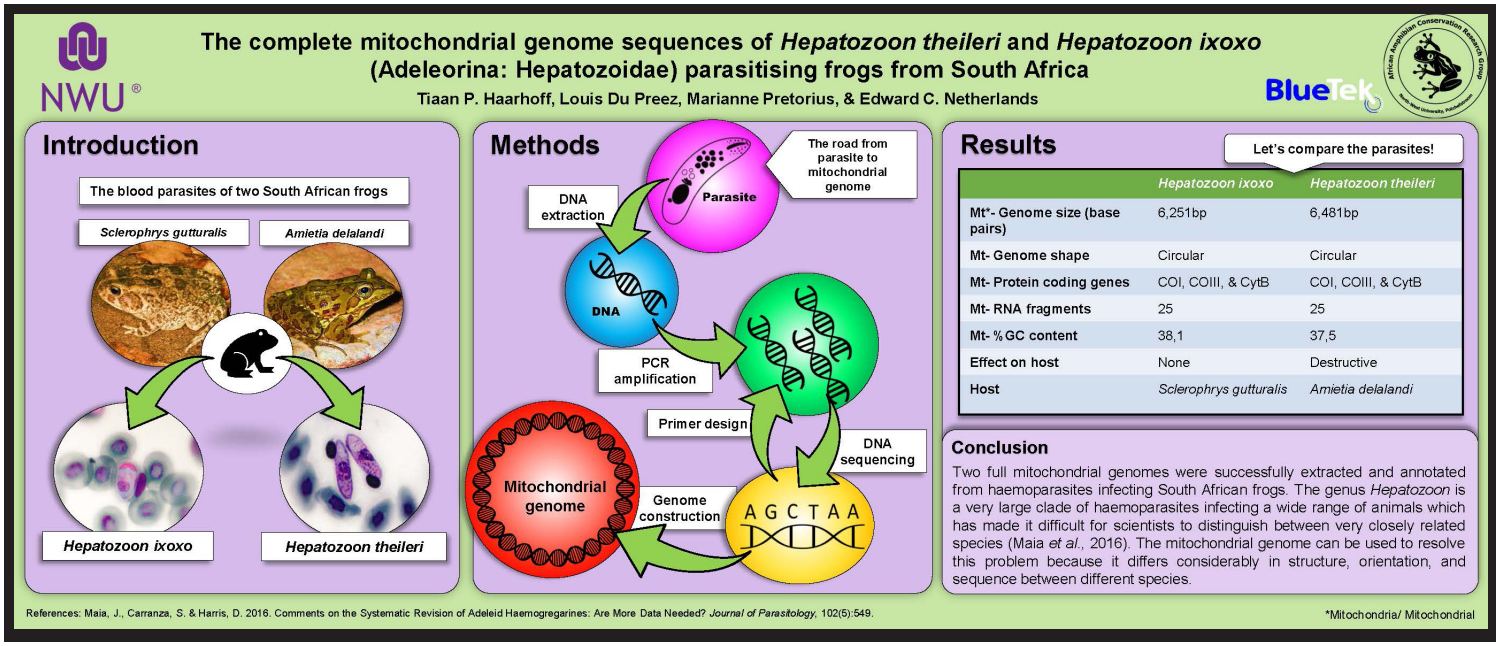
Graphical Abstract Competition Winner

Congratulations to **Tiaan Haarhoff** on winning the Graphical Abstract Competition. See the full extent of his graphical- and written abstracts below.

The complete mitochondrial genome sequences of *Hepatozoon theileri* and *Hepatozoon ixoxo* (Adeleorina: Hepatozoidae) parasitising frogs from South Africa

Tiaan Haarhoff[1], Louis Du Preez[1], Marianne Pretorius[2], Edward C. Netherlands[3]

[1]Unit for Environmental Sciences and Management, North-West University
[2]Department of Biochemistry, North-West University
[3]Department of Zoology and Entomology, University of the Free State



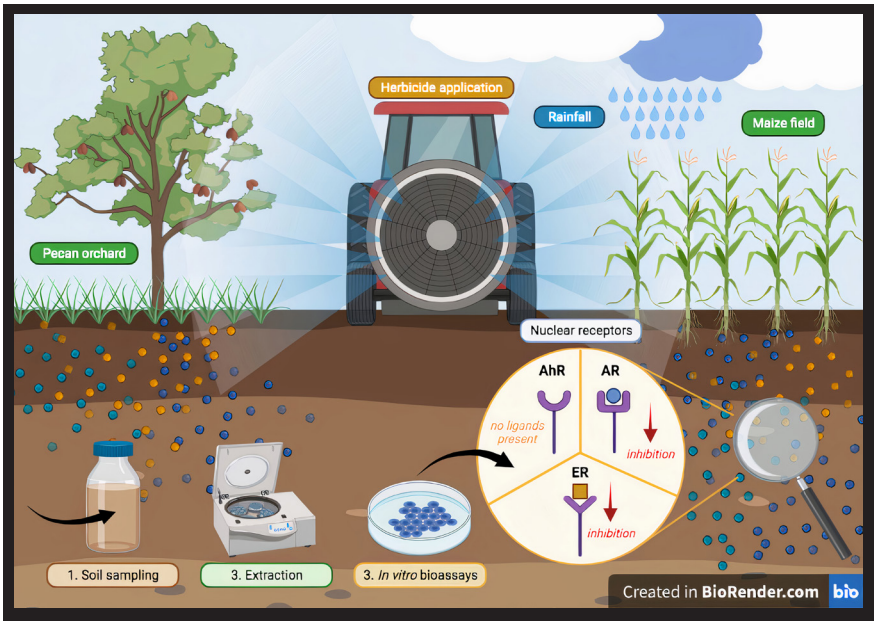
The mitochondrial genome has been the focus of many new phylogenetic analyses. It has been discovered that this genome contains various conserved regions that can be used as genetic barcodes. Traditionally, the 18S rRNA gene is used to elucidate relatedness between genera and species. While being a high-resolution barcode, some cases have shown that it is not accurate enough to distinguish between very closely related species. *Hepatozoon* is a large group of over 300 haemoparasites in the phylum Apicomplexa infecting a wide variety of hosts, which reflects its diversity. The 18S rRNA gene has failed to accurately indicate relatedness between various species in this group, for this reason, the cytochrome c oxidase subunit I (COI) gene has been proposed as an alternative. COI is one of three protein-coding genes on the mitochondrial genome. The problem is that the data needed to test this hypothesis is lacking. In this study, the full mitochondrial genome of frog parasites *Hepatozoon theileri* (Laveran, 1905) and *Hepatozoon ixoxo* (Netherlands, Cook & Smit, 2014) was extracted, amplified, and sequenced. The sequenced data were analyzed along with other extracted barcodes such as the 18S rDNA, ITS-1 region, and apicoplast 23S pl-DNA with the bioinformatics software Geneious prime. The full mitochondrial genomes were constructed and compared with existing mitochondrial genomes. Both isolates had remarkable resemblance to the existing frog parasite *Hepatozoon catesbianae* mitochondrial genome. The structure and orientation of these genomes are similar which shows that closely related haemoparasites should have similar gene structure, orientation, and sequences.

Graphical Abstract Competition Second- and Third Place

Congratulations to Ilzé Horak and Marlize Muller on obtaining second and third place in the Graphical Abstract Competition, respectively. See their graphical abstracts below and follow the added links to their written abstracts.

Endocrine disruptive effects of water-soluble agrochemicals extracted from maize and pecan soil

Ilzé Horak[1], Suranie Horn[1], Rialet Pieters[1]
[1]Unit for Environmental Sciences and Management, North-West University



EnvitroX

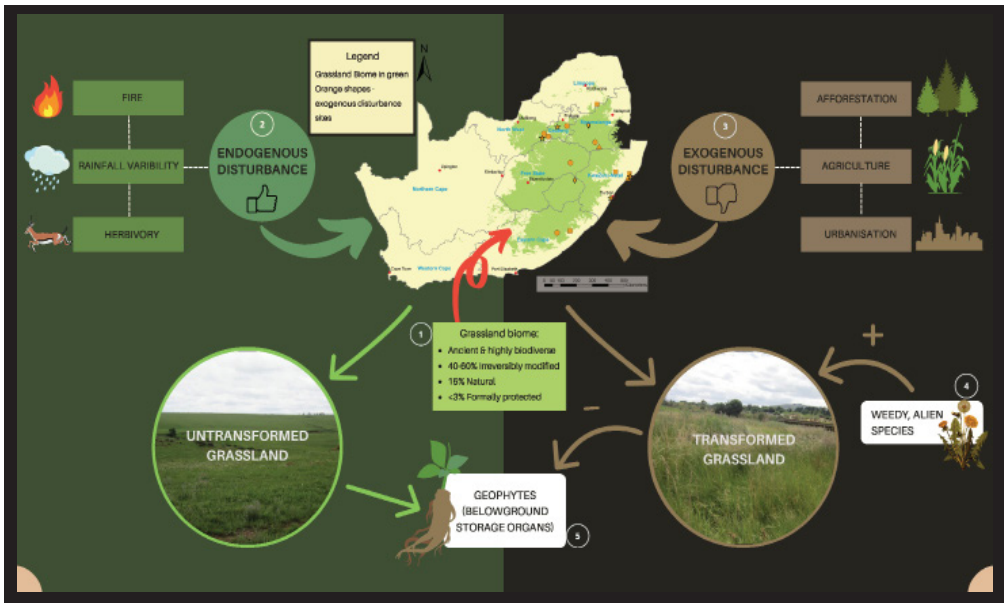
View Written Abstract

Exogenous disturbances lead to the displacement of indigenous forbs by weedy alien species

Marlize Muller[1], Stefan Siebert[1], Frances Siebert[1]
[1]Unit for Environmental Sciences and Management, North-West University

View Written Abstract

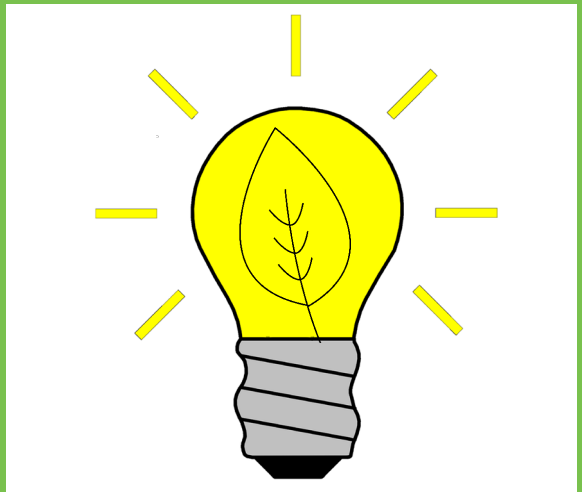
FERG
Forb Ecology Research Group



Why entrepreneurship?
We have another postgraduate competition in the pipeline and with this article, we aim to get your *innovative* juices flowing.

What can *you* do?
Start thinking about how your research can generate income and create job opportunities for others.

Instead of asking "Where will I find a job after university?", let's start asking "How can I create jobs for others when I leave?"
Prof Carlos Bezuidenhout



Entrepreneurship in Biological Sciences

Bibi Bouwman
Director Sustainability and Community Impact

Thinking of becoming an entrepreneur? If you have an appetite for risk, the possibilities are endless.

Let's qualify this by saying that entrepreneurs are not mavericks – they often take informed risks based on a specific window of opportunity identified. Some scientists dream of finding that sweet spot where they implement their science and make a bit of extra money. However, traditionally trained scientists, even though they have the potential to become business leaders, need more than just a hunch. There's a myriad of self-help articles on the internet promising the world and beyond, but for now, the most important are the following:

- Post-inspiration, do your homework, know your market and your product, and ensure that the potential market makes (money) sense. This requires going beyond a gut feeling or feedback from a couple of friends. The understanding of spending patterns, global trends and its influence on your market or niche is vital.
- A unique idea must be protected. The costs of patenting just locally, can be exorbitant and sometimes taking the 'trade secret route' is the best solution. This means that all the things we as academics are encouraged to do, must be avoided from the start. There is an excellent team at the Intellectual Property support office of the NWU that can guide you through this. If the university sees fit to assist with the patenting of your idea, remember this will require profit sharing. Know what your negotiation margins are. Sign non-disclosure agreements with people that you share your idea(s) with.
- If you are in the process of developing a product, keep an eye on the costs and be cognizant of the effects of the economy of scale. We are often convinced that we can produce a product in the lab, but will you be able to deliver a large order on time?
- Consider supply chain management and cash flow management, as key to making your business a success. Even though you may not know everything, you can hire competent people. Unfortunately, there are few angel investors in South Africa and the funders of your project / business will want a big share of your business and a quick return on their investment.

On the bright side, the possibilities are endless.

For example, you can address environmental challenges such as pollution, waste, drought, water quality management, biodiversity conservation and a variety of diseases. With the advancement of science in the space of, for instance, nanotechnology and a better understanding of complexity, genetics and ecology, biologists are perfectly positioned to think creatively and address some of these challenges.

Adaptation is the name of the game and being willing to collaborate with others can be useful if you have the correct protective measures in place.

Like the NIKE slogan says … "*Just Do It*" … **But** do your homework well!!

Interactive buttons

Hobby Showcase:
Ecological Interactions & Ecosystem Resilience

Cooking
Klaus Kellner

Photography & Photo Editing
Jacques Faul

Woodwork & Scale Plastic Model Kits & Frisbee
Wynand Muller

Making Music
Frances Siebert

Hobby Showcase:
Ecological Interactions & Ecosystem Resilience

Crochet, Cross-stitch & Ultimate frisbee
Marlize Muller

Landscape Photography
Tean Joubert

DIY & Home Improvement Projects & Hiking
Sarina Claassens

Brazilian Jiu-Jitsu
João Marcelo Silva

Interactive buttons

Hobby Showcase:
Ecological Interactions & Ecosystem Resilience

Cross Stitch
Yani Steyn

Photography
Priska Napo

Dinosaurs / Prehistoric Life / Palaeontology
Willie Cloete

Growing Bonsai Trees
Pieter Malan

Hobby Showcase:
Ecological Interactions & Ecosystem Resilience

Saxophonist (in training)
Sarel Cilliers

Food Content Creation
Seipati Poopedi

Hiking, Frisbee, Rock Climbing, Painting / Drawing, Reading, Cycling & Photography
Elaine Slooten

Acknowledgements

We wish to thank the following people who have made invaluable contributions towards the *Winter* edition of ENVIRA 2022:

- Prof Frank Neumann, for his willingness to participate in this edition's interview
- All authors who readily shared their accolades, community projects, hobbies, reflection pieces, and research with readers of this edition
- Ms Bibi Bouwman, the director of Sustainability and Community Impact, for her article on Entrepreneurship in Biological Sciences, as a foundation for our future entrepreneurship competition

(Graphical Abstract Competition)

- All participants who sent in their Graphical Abstracts. We hope that you found this competition to be a valuable learning experience for future science communication.
- All the judges of the Graphical Abstract competition: Professor Hanlie Moss (Final Judge), Dr Ademola Adetunji, Dr Anneke Lincoln-Schoeman, Ms Nisa Ayob, Dr Anrich Kock, Dr Mariske van Aswegen, Dr Suzan Oelofse, Dr Sutapa Adhikari. We sincerely appreciate your time and effort during this process.
- BlueTek for sponsoring the Graphical Abstract competition and Lieb Venter for assisting the editors with sponsorship arrangements.

All your contributions are greatly appreciated.

We are incredibly excited to share more research reflections and news in the upcoming *Spring* edition 2022.

Until next time.

Frances and Clarissa

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