ORC 25

PRESERVING OUR PRECIOUS PLANET

RESEARCH AND CONSERVATION
OPPENHEIMER GENERATIONS

People | Places | Planet

14th OPPENHEIMER RESEARCH CONFERENCE

Randjesfontein Cricket Ground, Midrand
15-17 October 2025

Juri Filonzi (PhD candidate from University of Fort Hare) using VHF telemetry to track a slender mongoose at its night resting site in Tswalu. The focus of Juri's research is the ecology of the slender mongoose and the Cape grey mongoose in an arid environment.

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Welcome note

Since its inception in 2010, the Oppenheimer Research Conference (ORC) has grown to become an important event on the global academic calendar. Today, it provides a unique showcase for research covering a wide variety of environmental and natural sciences fields.

This diversity is truly exceptional. Usually, when one attends a conference, it has a single focus or specialisation, such as ornithology, entomology or archaeology. However, it all happens here, facilitating interdisciplinary engagement among scientists from diverse fields.

The research presented here is innovative, fostering engagement and collaboration, not only across disciplines but scales, from microscopic to landscape and global. In doing so, we are bringing African voices to global conversations on environment, conservation, and sustainability.

It's not only about scientists talking to other scientists, either. We aim to create a sustainable, long-lasting movement for nature because we need to move beyond pure discussion into translating our findings to address global challenges and together providing the answers.

This year's theme, *Preserving Our Precious Planet*, is both a call to action and a commitment to advancing scientific research, innovation, and collaboration for a sustainable future. At its heart is the recognition of our shared responsibility to protect Earth's natural systems.

The 14th Oppenheimer Research Conference will spotlight research and transformative solutions aimed at conservation, climate resilience, and ecological restoration. Together, we will explore how science can help us steward our planet wisely — for today, and for generations to come.

We are confident you will be inspired over the next three days by the various crosscutting presentations and posters, on topics such as tackling biodiversity loss, land management, human-wildlife interactions, climate change adaptation and wildlife economies, as we work together to catalyse groundbreaking research to help solve some of the most pressing challenges facing our planet today.

Thank you for joining us.

Nicky and Jonathan Oppenheimer

Introduction

The Oppenheimer Research Conference (ORC) continues to bring together select individuals and organizations operating and interested in the fields of natural and environmental science. It offers a uniquely diverse and multi-disciplinary programme, that takes the form of plenaries, presentations, posters and panel discussions.

The conference aims to contribute to the conservation of ecosystems, biodiversity and heritage by creating an inclusive and encouraging platform for quality presentations, discussions, networking and collaboration. Since its inception in 2010, the conference has grown into an event which we can proudly say is a highlight on the science calendar. The conference is hosted by Oppenheimer Generations Research and Conservation (OGRC).

This showcase of excellence offers ORC delegates opportunities to learn and build networks and to encourage action based on solid research, which can provide solutions to mitigate environmental and conservation tipping points, focused on the following five areas:

Biodiversity loss – How can we mitigate biodiversity loss in Africa?

Landscape ecology – How do we prioritise ecosystem interventions in Africa? What gets used, protected and rehabilitated?

Climate change – How will climate change affect Africa, on land and along its coastline? What should be done to mitigate or adapt to the massive upheavals already well underway?

Wildlife economies – How do we grow inclusive economies that enable both the use and preservation of ecosystems for future generations?

Heritage – How can we take what we have learnt from the past to inform the future?

The Oppenheimer Research Conference provides a platform to showcase Africa-led research, and to amplify the voices of African scientists to ensure that sustainable solutions are forged, not only for Africa, but for the world.

Day 1: Wednesday, 15 October 2025

Session 1: Chair | Duncan MacFadyen	
08:00 – 09:00	Registration / Networking / Refreshments
09:00 – 09:10	Welcome and introduction **Nicky Oppenheimer**
09:10 – 09:20	Keynote address **Hon. Bogolo Kenewendo**
09:20 – 09:50	Integrating health and people in gorilla conservation Plenary **Gladys Kalema-Zikusoka**
09:50 – 10:20	Climate change and southern African birds: 15 years of the Hot Birds Research Project Full presentation **Andrew McKechnie**
10:20 – 10:50	**Morning tea**
Session 2: Chair | Rendani Nenguda	
10:50 – 11:05	Conservation insights drawn from a millennium of grazing dynamics at Hluhluwe-iMfolozi Park, South Africa Results presentation **Abraham Dabengwa**
11:05 – 11:35	Bending the curve of biodiversity loss: What are we trying to change? Full presentation **Belinda Reyers**
11:35 – 11:50	Navigating the green dilemma: Stakeholder-driven research priorities to curb biodiversity loss in South Africa's green energy transition Results presentation **Merlyn Nkomo**
11:50 – 12:05	Soil fungal diversity of Tswalu Kalahari Nature Reserve based on high throughput sequencing Results presentation **Eduard Venter**
12:05 – 12:35	An energy flow view of terrestrial ecosystems Full presentation **Yadvinder Malhi**
12:35 – 12:50	Seasonal variation and drivers of parasite prevalence in migratory Serengeti wildebeest Results presentation **Gareth Hempson**
12:50 – 13:00	Conference photo
13:00 – 14:00	**Lunch**

Session 3: Chair | Pumla Dlamini	
14:00 – 14:30	Advancing One Health through the African Microbiome Project Full presentation **Thulani Makhalanyane**
14:30 – 14:45	Evaluating cheetah reintroduction success: A comparative study of two reserves in KwaZulu-Natal Results presentation **Dorette Pretorius**
14:45 – 15:00	Evaluating conservation corridor success for rare and common dragonflies using zeta diversity Results presentation **Gabriella Kietzka**
15:00 – 15:15	Biological responses to climate and land use changes in the KwaZulu-Natal rivers Results presentation **Lwandile Ngozi**
15:15 – 15:30	Burning for carbon: Fire, afforestation and soil organic carbon dynamics in South Africa's Afromontane grasslands Results presentation **Lindokuhle Dlamini**
15:30 – 16:00	**Afternoon tea**
Session 4: Chair | Maxwell Gomera	
16:00 – 17:00	Minesterial panel – Alignment of interests: Transitioning from short-term philanthropy to permanent outcome-based capital through the reduction of frictional costs **Hon. Bogolo Kenewendo** **Hon. Dr Rodney Sikumba** **Hon. Jiwoh Abdulaia** **Hon. Dr Evelyn Ndlovu**
17:00 – 17:30	**Break | Painted Wolf Wines – wine tasting**
17:30 – 17:40	Movie introduction **Anele Mdoda** and **Frankie du Toit**
17:40 – 18:10	**Movie screening:** *The Last Ranger*
18:10 – 18:40	Q&A
18:40 – 19:30	Canapés
19:30	Venue close

Day 2: Thursday, 16 October 2025

Session 1: Chair | Peter Makumbe	
08:00 – 08:30	Registration / Networking / Refreshments
08:30 – 09:00	Linking wildlife, conservation and people across landscapes Plenary **David Western**
40 minutes	**Speed presentation session**
09:00 – 09:05	Moss bioindicators: Factors influencing species diversity and community assembly along a rural-urban gradient in Madagascar's capital city Speed presentation **Antonio Razafindramboa**
09:05 – 09:10	Temminck's pangolin (*Smutsia temminckii*) habitat use in a dryland environment Speed presentation **Benjamin Melamdowitz**
09:10 – 09:15	Climate change and cyanobacteria: How construction of artificial waterholes can influence bloom potential in a semi-arid system Speed presentation **Laurene van Dijk**
09:15 – 09:20	Spatial and temporal gradient effects on ant and spider diversity in the Natal Midlands Speed presentation **Asande Hadebe**
09:20 – 09:25	White-browed sparrow-weaver structures as a resource to avian communities in the Kalahari Speed presentation **Lesedi Moagi**
09:25 – 09:30	Wetlands provide a stable forage resource for ungulates in a variable Highveld ecosystem Speed presentation **Daleen Steenkamp**
09:30 – 09:35	Legacy and emerging contaminants in an ecologically critical southern African river catchment Speed presentation **Shaskia John**
09:35 – 09:40	**Speed presentation group Q&A session**
Poster session	
09:40 – 11:00	Morning tea and poster session

Session 2: Chair | Tracey Webster	
11:00 – 11:15	Origins and invasion debt of Quilted melania (*Tarebia granifera*) (Lamarck, 1822) in Southern Africa Results presentation **Sive Kolisi**
11:15 – 11:45	African lions: Safe and sound? Full presentation **Paul Funston**
11:45 – 12:00	Should wild animal welfare be considered in conservation? Results presentation **Dilys Roe**
12:00 – 12:30	Applicability of Environmental Management Systems (EMS) for effective management of Transfrontier Conservation Areas involving Zimbabwe Full presentation **Patience Gandiwa**
12:30 – 12:45	Triggering rapid scaling of agroforestry: A case of The International Small Group and Tree Planting Program (TIST) in Uganda Results presentation **Antony Emenyu**
12:45 – 13:00	Morally contested conservation Results presentation **Darragh Hare**
13:00 – 14:00	**Lunch**
Session 3: Chair | Wendy Panaino	
14:00 – 14:15	Assessing nitrogen dioxide in the highveld trophosphere: Pandora insights and TROPOMI Sentinel-5P evaluation Results presentation **Refilwe Kai-Sikhakhane**
14:15 – 14:30	Big data's big daddy! Aerial-born multi-sensor data collection beyond the curve! Results presentation **Steven Johnson**
14:30 – 15:00	How doth the little crocodile Full presentation **Stephan Woodborne**
15:00 – 15:15	Improving AI for wildlife tracking: The value of expert tracker knowledge and training data Results presentation **Tinao Petso**
15:15 – 15:30	Ecophysiological responses and projected climatic suitability of Podocarpaceae in South Africa Results presentation **Thando Twala**
15:30 – 16:00	**Afternoon tea**

Session 4: Chair | Sally Archibald	
16:00 – 17:00	Panel discussion – Future ecosystems for Africa: Lessons, impact and the path forward Panel members: **Laura Periera** **Odirilwe Selomane** **Sènankpon Tcheton** **Tatenda Gotore** **Mohammed Armani** **Kim Zoeller** **Mulako Kabisa**
17:00 – 17:20	**Break**
17:20 – 18:00	New JWO Research Grant Recipient Award presentation **Jonathan Oppenheimer**
18:00	**Cocktail function**

Day 3: Friday, 17 October 2025

Session 1: Chair | Andre Tranquelini	
08:00 – 08:30	Registration / Networking / Refreshments
08:30 – 09:00	Nature works: Turning Africa's wild side into wealth Plenary **Edwin Tambara**
09:00 – 09:15	Stuck in a rut: Variation in reproductive behaviour, spatial patterns and endocrine activity in impala (*Aepyceros melampus*) Results presentation **Juanita Wessels**
09:15 – 09:45	Drugs, guns and eels: The decline of anguillid eels in East Africa and beyond Full presentation **Lee Baumgartner**
09:45 – 10:00	Understanding climate change adaptation policy, barriers and readiness in South Africa Results presentation **Vhalinavho Khavhagali**
10:00 – 10:15	Smuggled hitchhikers: Ticks on trafficked pangolins and scales pose a hidden pathogen threat Results presentation **Zwannda Nethavhani**
10:15 – 10:30	Thulamela: Gold, human burials and a forgotten African kingdom Results presentation **Tim Forssman**
10:30 – 10:40	**JWO Research Grant 2024 snapshot**
	Biophysical approaches to wildlife conservation: One year of interdisciplinary work **Shannon Conradie**
10:40 – 11:10	**Morning tea**
Session 2: Chair | Max Makuvise	
11:10 – 11:25	How dehorning reduces rhino poaching Results presentation **Timothy Kuiper**
11:25 – 11:40	What evidence exists for the financial performance of wildlife-based land use in southern and East Africa Results presentation **Susan de Witt**

11:40 – 11:55	Fire frequency and experimental warming changes soil microbial diversity in alpine grassland, South Africa Results presentation **Sibusiso Dlamini**
11:55 – 12:25	Clicks and the environment: Journalism's responsibility to deepen climate literacy Full presentation **Journalism panel**
12:25 – 12:40	The potential of legume cover crops to improve soil acidity and nutrients in South African sugarcane fields Results presentation **Naledi Zama**
12:40 – 12:55	Understanding the cognitive consequences of climate change in wild animals Results presentation **Ben Ashton**
12:55 – 13:10	Estimating large carnivore densities using spatial capture-recapture in the arid Tswalu Kalahari Reserve, South Africa Results presentation **Marna Visagie**
13:10 – 13:40	Human-centred conservation: Communities at the core Full presentation **Katie MacKenzie** and **Lessah Mandoloma**
13:40 – 14:00	Conference awards **Nicky Oppenheimer** and close **Jonathan Oppenheimer**
14:00 – 15:00	**Lunch**
Session 3: Chair | Jonah Western	
15:00 – 16:00	Community Science Roundtable: How can conservation win space for wildlife beyond parks by engaging and improving the wellbeing of communities? **Duan Biggs, Victor Mose** and **Lucy Waruingi**
16:00	Venue close

Poster session schedule

Please see pages 53 – 92 for the poster abstracts

Alan Nare, Tapiwa Gumbo, Guy Lomax and Andrew Cunliffe	Modelling livestock and wildlife herbivory intensity over space and time at the Shangani Ranch
Andrea Marais-Potgieter and Laura Pereira	Trans-species accompaniment in conservation: A psychological perspective on the future
Angela Effiom, Jemma Finch, Trevor Hill and Marion Bamford	Pollen atlas of subtropical southern Africa (Pollen and Spores of KwaZulu-Natal)
Anneke Nel, Leanne Venter and Juan Scheun	Comparing leopard (*Panthera pardus*) population monitoring techniques: Baited vs standard camera trapping
Aphiwe Mtolo, Caswell Munyai and Rob Slotow	Land use intensity reduces ant diversity and homogenises their communities in the city of Tshwane, South Africa
Arnim Marquart and Leslie Brown	Interacting effects of different fire regimes, simulated ungulate browsing and reseeding for restoring *Seriphium plumosum*-encroached areas in the Telperion Nature Reserve, South Africa
Bharti Arora, Samrat Mondol and Shiwangi Rai	The mystic tales of high altitude mammals: Endocrine insights of markhor (*Capra falconeri heptneri*) at Darjeeling Zoo, West Bengal, India
Blessing Gumindoga, Virimai Madzivire and Admore Waniwa	Assessing the greenhouse gas emissions potential of extensive cattle production systems in Zimbabwe
Bob Mandinyenya	Variations in space use by African savanna elephants within the Gonarezhou National Park landscape, Zimbabwe
Bruce Crossey, Andre Ganswindt, Darren McLennan and Elizabeth Pienaar	The use of electrodermal activity to examine the psycho-physiological effects of wildlife-based tourism
Buster Mogonong, Jolene Fisher, Wayne Twine and Gregor Feig	Perceptions on drivers of small-scale cropland abandonment across scales in South Africa's former homelands
Carol Munro, Pfananani Ramulifho, Alan Barrett and Leslie Brown	Macroinvertebrates as indicators of stream health in Telperion Nature Reserve, Mpumalanga
Caswell Munyai	Post-fire recovery of arthropod communities: Seasonal dynamics across a grassland regeneration timeline in the Natal Midlands
Chafika Phiri, Andrew Cunliffe, Sarah Venter, Dave Hodgson and Dawn Cory-Toussaint	Informing our stewardship of African baobabs (*Adansonia digitata* L.): Population distribution and sustainable use

Chanel Lewis	Integrating evolutionary constraints into conservation: Dietary adaptation and morphological limits in ruminants
Chesaid Phili, Olga Kupika and Peter Makumbe	An ethnobotanical assessment and conservation status of medicinal plants in the semi-arid Shangani Holistic Ranch and adjacent communities in Zimbabwe
Chloe Caister, Francesca Parrini and Don Ross	Contextual and individual determinants of quantity discrimination in African elephants
Chrispin Odhiambo	Responses of tree phenology to temperature and rainfall cues in a semi-arid savanna, Laikipia, Kenya
Christiaan Harmse, Pieter Malan, Klaus Kellner and Jonathan Birch	*Rhigozum trichotomum* removal effects at Tswalu on Kalahari dune veld herbaceous layer: Comparing 50% and 100% intensities
Cilliers van der Merwe, Michael Somers, Andre Ganswindt and Andrea Webster	African clawless otters (*Aonyx capensis*) and their food: How mercury and microplastics impact otter welfare
Cornelius Louw, Jason Marshal and Francesca Parrini	Density dependence in large herbivores inhabiting an insular nature reserve
Devon Holden, Marietjie Oosthuizen, Haemish Melville, Leigh Richards and Georgia Muller	Assessing the performance of acoustic recording devices for recording rodent ultrasonic vocalisations
Elizabeth Overton, Rob Davis, Virginie Rougeron and Jan Venter	Tracking cheetahs: Quantifying hunting success through an age-old tracking method
Emily Madsen	Mysterious, missing, or menacing: Untangling the drivers of local ecological knowledge of Laikipia's carnivores
Emma Neethling, Fletcher Vincent, Gabi Kietzka, Casper Crous, Cang Hui and Francois Roets	Clean kills and dirty data: Do preservation agents alter beetle isotope signatures?
Erin Brooke	Microplastics and mercury: Highveld mole-rats (*Cryptomys hottentotus pretoriae*) as sentinels for environmental health monitoring
Frances Cornelius, Duncan MacFadyen and Haemish Melville	A mound of possibilities: Termitaria as multifunctional microhabitats for diverse species
Fritha Langerman	Extinction in translation: Replication, fragmentation and absence as strategies of visual display
Gideon de Wet, Rojanette Coetzee and Noluthando Aruwajoye	Transforming organic waste into agricultural resources: A circular economy model for agricultural food systems
Gideon Haingura and Morgan Hauptfleisch	Ecological connectivity across a diverse land use system in Namibia's Kunene region using elephants as a proxy

Itai Matereke and Alban Mugoti	Effects of grazing systems on graze characteristics at Shangani Holistic Ranch, Matabeleland South Province
Janine Baxter, Monica Mwale, Marli de Bruyn and Sonia Kropff	A comprehensive overview of the avian DNA barcoding reference library in South Africa
Jeanne Tarrant, Keir Lynch and Ryan Edwards	Learning to listen: Amplifying the voice of an endangered endemic frog as an indicator of montane wetland health
Jessica Tacey	Predicting the problem: Defining behavioural and anthropogenic factors that contribute to human-elephant conflicts in north-western Zimbabwe
Jonathan Leeming	Reducing the burden of scorpion stings in southern Africa: A novel approach
Jonathan Birch, Pieter Malan, Klaus Kellner and Christiaan Harmse	Evaluating bush control methods on vegetation
Joshua Webber, Marietjie Oosthuizen, Rob Simmons and Odette Curtis-Scott	Temporal drivers of collision risk at wind energy facilities for the endangered black harrier
Kayla Swan, Marietjie Oosthuizen and Sonja Krüger	A multidimensional study of bearded vulture chick development
Kerry-Anne Grey, Nicola Stevens and Yadvinder Malhi	Response of African savanna trees to extreme heat
Khensani Masingi, Marquart Arnim, Alan Barrett and Leslie Brown	Evaluating the influence of *Seriphium plumosum* and grazing lawns on termite diversity and foraging
Klarine Engelbrecht, Hayley Clements, Howard Hendricks and Karen Esler	Understanding beneficiary expectations in South African National Parks's game loan programme
Kym Morton	Mining for Wildlife
Lauren Harrington and Amy Dickman	How should wild animal welfare be considered in conservation?
Lawrence Steyn, Kathryn Williams, Greg Distiller, Gareth Mann and Anita Wilkinson	Tails through time: Leopard population dynamics in the Little Karoo
Layla van Zyl, Bernard Coetzee and Robert Guldemond	Exploring elephants' function in shaping ecosystems
Leigh Richards, Gregory de Jong and Haemish Melville	An inventory of the bats of Telperion Nature Reserve: Taxonomic diversity and call library
Lolie Ngolaharintsoa, Rivoharifara Randrianarimanana, Onjaniaina Olivia Andrianjatovo and Lovanomenjanahary Marline	The moss and liverwort of Tsaratanana, the highest mountain of Madagascar

Loraine Shuttleworth, Andre Ganswindt and Els Vermeulen	Calf growth and maternal energy investment in South African southern right whales
Lovemore Sibanda	Cheetah populations in Zimbabwe declining rapidly
Lucy Chimes, Timothy Kuiper and Colleen Downs	A landscape-level analysis of the impacts of dehorning on rhino reproduction in southern Africa
Luyanda Hlamaphi, Silvia Ceausu and Caswell Munyai	Insect pollinators of avocado (*Persea americana*) in Africa: A systematic review
Lydia Bhebe, Hayley Clements and Wiseman Ndlovu	A One Health framework analysis for sustainable game meat production and supply
Mahlatse Mashaphu, Colleen Downs, Sandi Willows-Munro and Lehlohonolo Adams	Evaluating the efficacy of eDNA metabarcoding for detecting and monitoring native and invasive freshwater fish in South African river systems
Malibongwe Sithole and Leslie Brown	Investigating the impact of *Seriphium plumosum* encroachment on soil water dynamics in grassland ecosystems
Mart-Mari Scholtz and Engela de Crom	Beyond the photo: Insights from a wildlife citizen science project
Megan Roberts, Haemish Melville and Kerry Slater	Aardwolf ecology in a mesic grassland ecosystem
Miane Reynolds, Andre Ganswindt and Loraine Shuttleworth	Physiological stress-related response of orphaned elephants and individuals in a semi-captive herd during reintroduction
Mmatsawela Ramahlo, Grant Hall, Michael Somers and Andre Ganswindt	Where's the beef? Stable isotopic analysis of dietary responses to land use and seasons in southern African rodents
Mongezi Shangase	Using charcoal and pollen to assess fire history and vegetation flammability in African savanna at long timescales
Natasha Balmer and Ben Smit	The effects of localised habitat degradation in the Kalahari on the physiology and behaviour of white-browed sparrow-weavers (*Plocepasser mahali*)
Neo Debeila, Mary-Jane Thaela-Chimuka and Ida Risenga	Characterisation of phytochemical constituents and phytopharmacological activities of the South African freshwater medicinal plant *Cyperus laevigatus*
Nico Avenant and Duncan MacFadyen	Tracking succession and disturbance through small mammal communities in the Kalahari
Nkanyezi Radebe, Zabentungwa Hlogwane, Caswell Munyai and Muthulisi Siwela	Improving the nutritional composition of bread through supplementation with edible insects
Nokuthokoza Maqeda, Peter Makumbe and Allan Sebata	Effects of overnight kraaling on woody plants resprouting and grass parameters at Shangani Holistic

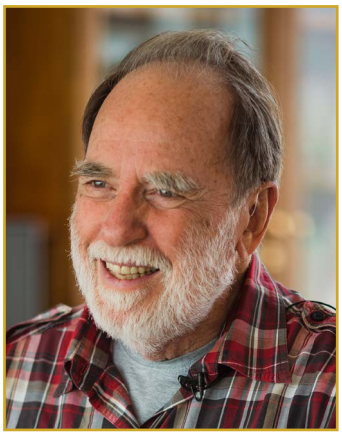
Norman Owen-Smith	How distinctive features of Africa's ecology nurtured human origins
Oliver Cowan	Balancing the roll-out of renewable energy and conservation in South Africa: Spatial planning in a biodiversity hotspot
One Claeys and Pierre Linchamps	Fossilised microfauna remains from Gcwihaba Caves: Preliminary results on taphonomical and palaeoenvironmental implications
Patience Tshuma, Dorothy Queiros and Kevin Mearns	Securing resilient futures: Programmes for collaborative conservation in protected areas – empowering women in rural communities
Percy Moyo, Haemish Melville, Emmanuel Do Linh San and Courtney Marneweck	Spatiotemporal ecology of the yellow mongoose (*Cynictis penicillata*) in the Rand Highveld grassland
Pfananani Ramulifho	Impacts of woody invasive alien plants on macroinvertebrates and stream flow regimes in the Soutpansberg strategic water source area
Pierre Linchamps, Raphaël Hanon, Emmanuelle Stoetzel, Dominic Stratford, Christine Steininger, Jean-Tristan Brandenburg, Bernhard Zipfel, Sandrine Prat, Raphaël Cornette and Pierre Latouche	Reconstructing the palaeoclimate of South Africa's Cradle of Humankind over the last 3,5 million years using machine learning and the mammalian fossil record
Rigardt Hoffman, Courtney Marneweck, Julian Fennessy and Daniel Parker	The importance of private land for conservation: An update on the population status of southern giraffe in South Africa
Ruhan Verster, Francois Retief, Reece Alberts and Dirk Cilliers	Characterising southern African national park buffer zones
Sindiso Nkuna and Craig Morris	Sustainable management of South African mesic grasslands: Lessons from forbs
Sindiswa Zondo, Zabentungwa Hlongwane, Caswell Munyai and Muthukisi Siwela	Nutritional advancement and colour changes of South African staple food (thin and crumbly maize porridge) when supplemented with edible insects
Su-Ané Greyling and Letitia Pillay	Exploring the potential of aromatic perennials for remediation of mine-tailings in South Africa
Tamanna Patel, Caitlin Smith, Lizanne Roxburgh, Oliver Cowan, Jessica da Silva and Domitilla Raimondo	Mammal Red List of South Africa, Eswatini and Lesotho: Key results from the 2025 revision
Terèze Viljoen, Bernard Coetzee and Robert Guldemond	The movement ecology of African elephants (*Loxodonta africana*) in Kasungu National Park, Malawi

Thembalinye Chonco, Sindiso Nkuna, Caswell Munyai and Rob Slotow	Examining patterns of arthropod and plant taxonomic and functional diversity across the 100-year floodplain along the Umngeni River
Thendo Mutshekwa, Samuel Motitsoe, Trishan Naidoo, Musa Mlambo and Nelson Odume	Plastic particles in pristine waters? Investigating microplastic pollution in natural springs of southern Africa
Thilivhali Rasimphi, David Tinarwo and Beata Kilonzo	Advancing waste-to-energy solutions for sustainable rural development: A case for biogas technology in enhancing climate resilience and livelihoods
Tumelo Matlou and and Ida Risenga	Nutritional and Functional Characterisation of *Corchorus olitorius* Fruits: An Indigenous Resource for Food Security in Limpopo, South Africa
Vanessa Lauchande, Lawrence Malinga and Caswell Munyai	Effect of genetically modified sugarcane in combination with sterile insect releases to control *Eldana saccharina*: A shade house trial
Victor Mhaka, Olga Kupika, Oliver Moses and Edson Gandiwa	A critical review of the methods for estimating the carbon sequestration potential of tropical savanna ecosystems under different conservation approaches using insights from southern Africa
Wallace Gara	Impacts of land use changes on ecosystem services in an intensive agricultural area: A case study of Hippo Valley Estates
Yolanda Mutinhima, Hayley Clements, Lovemore Sibanda and Darragh Hare	Rethinking the role of researchers in creating pathways to human-wildlife coexistence
Zabentungwa Hlongwane, Rob Slotow and Caswell Munyai	The role of edible insects in rural livelihoods, and identified challenges in Vhembe District, Limpopo, South Africa
Zoe Jewell, Sky Alibhai, Nico Avenant and Maria Oosthuizen	Paws for thought: Using Footprint Identification Technology (FIT) to assess ecological integrity through the lens of small mammals

Abstracts and Biographies

Day 1: Wednesday, 15 October 2025

Welcome: Nicky Oppenheimer



Nicky Oppenheimer – a South African businessman and conservationist – was educated at Harrow School London and the University of Oxford, where he studied Politics, Philosophy and Economics. He continues his long and respected legacy of environmental and conservation leadership by serving on the board of the Tswalu Kalahari Game Reserve. Nicky is also a keen supporter and sponsor of the Oppenheimer Research Conference, which brings together pre-eminent individuals and organisations from the natural and environmental science industries across the world. In 2005, Nicky and Jonathan established the Brenthurst Foundation to reflect the family's contribution to the debate around strategies and policies for strengthening Africa's economic performance. As a trustee of the Oppenheimer Memorial Trust, Nicky strongly believes in investing in education, and he advocates that every South African has the right to a high standard of education at all levels. He holds an honorary Doctorate in Technology from Technikon Witwatersrand in South Africa, making him the first recipient from both the public and private sectors, and also holds an honorary Fellowship from the London Business School. Additionally, Nicky is a recipient of the Presidential Order of Honour from His Excellency Mr Festus Gontebanye Mogae, the president of the Republic of Botswana.

Keynote address: Hon. Bogolo Kenewendo, Minister of Minerals and Energy of Botswana

Bogolo Joy Kenewendo's career spans trade and investment, finance and development, and public policy. Kenewendo served as a Specially Elected Member of Parliament and Cabinet Minister of Investment, Trade and Industry in Botswana. She serves on various corporate and philanthropic boards, including as Chairperson of Bank Gaborone, and as Non-Executive Director of the Africa Free Trade Area Adjustment Fund Corporation and the Africa Center for Economic Transformation. She also advises governments and international institutions on trade and economic development policy. Kenewendo has served on the G7 Gender Equality Advisory Council,

the United Nations Secretary-General António Guterres's High-Level Panel on Digital Cooperation, the Advisory Group on the gender architecture of the UN and the group on Financing for Development. She is also a member of the World Economic Forum (WEF) Trade Advisory Group, a member of the Global Future Council on Global Public Goods in the Fourth Industrial Revolution, and a WEF Young Global Leader. She is a Non-Resident Fellow with the Center for Global Development. She is frequently named among Africa's Most Influential People by various publications. In 2022, she was named among the prestigious *Time* magazine's TIME100 Next Honourees, highlighting 100 emerging leaders from around the world who are shaping the future and defining the next generation of leadership. The year 2024 set a different tone for Kenewendo and Botswana, as she was specially elected to be a Member of Parliament under the new administration and sworn in as Minister of Minerals and Energy.

Plenary: Gladys Kalema-Zikusoka

Dr Gladys Kalema-Zikusoka is the founder and CEO of Conservation Through Public Health (CTPH), an award-winning NGO and non-profit that protects endangered gorillas and other wildlife through One Health approaches. After graduating with a Bachelor in Veterinary Medicine from the Royal Veterinary College, University of London, in 1995, she established Uganda Wildlife Authority's first veterinary department in 1996. In 2000, she enrolled in a Zoological Medicine Residency and Master's in Specialised Veterinary Medicine at North Carolina Zoological Park and North Carolina State University, where her master's research on disease at the human/wildlife/livestock interface led her to found CTPH in 2003. In 2003, she also completed a certificate in non-profit management at Duke University. In 2015, she founded Gorilla Conservation Coffee to support farmers living around habitats where gorillas are found. CTPH's most recent award is the 2020 Saint Andrews Prize for the Environment. Dr Kalema-Zikusoka became an Ashoka Fellow in 2007, a *National Geographic* Explorer in 2018 and a Mulago Foundation Henry Arnhold Fellow in 2018. In 2023, she received an honorary doctorate from her alma mater, Royal Veterinary College, University of London. She won the 2008 San Diego Zoo Conservation-in-Action Award, the 2009 Whitley Gold Award, the 2011 WINGS Women of Discovery and Exploration Humanity Award, the 2017 President of Uganda's Golden Jubilee Award for her contribution to the nation as a veterinarian and conservationist, and the 2018 Sierra Club EarthCare Award; and she was a finalist for the 2019 Tusk Award for Conservation in Africa. In 2020, she received the Uganda Veterinary Association World Veterinary Day Award and the Aldo Leopold Award for Mammologists, and she became a COVID-19 heroine for the Ellen Johnson Sirleaf Foundation. In 2021, she was recognised by Avance Media as one of the 100 Most Influential Women in Africa and won the United Nations Environment Program Champions of the Earth Laureate in the Science and Innovation Category. In 2022, she received the Edinburgh Medal for Science and Humanity for her work in planetary health, and won the Tallberg-SNF-Elliasson Global Leadership Prize. In 2023, she was a finalist for the Indianapolis Prize for Animal Conservation, and was recognised as a Population Matters World Population Day Change Champion in the Earth Champion category. BBC 100 Women recognised Dr Kalema-Zikusoka in their 2023 100 Inspiring and Influential Women in the Climate Pioneer category, ahead of COP28. In 2024, she won the Mammal Society President's Award and the Forum for Women in Democracy (FOWODE) Tourism Sheroes Award. She is currently the Chairperson of the

Explorers Club Africa Chapter, she is on the leadership council of Women for the Environment – Africa, and she is vice president of the African Primatological Society. In 2021, she became a member of WHO SAGO (Scientific Advisory Group for the Origin of Novel Pathogens) and joined the advisory committee of the International Livestock Research Institute (ILRI) One Health Research, Education and Outreach (OHRECA). Dr Kalema-Zikusoka is the author and co-author of 2 books and over 60 papers and book chapters. Her most recent book, published in 2023, is a memoir called *Walking with Gorillas: The Journey of an African Wildlife Vet*, about her conservation and leadership journey shaped by One Health.

Session 1

Integrating health and people in gorilla conservation

Gladys Kalema-Zikusoka
Conservation Through Public Health (CTPH), gladys@ctph.org

Conservation Through Public Health (CTPH) is an award-winning Ugandan grassroots NGO and US-registered non-profit founded in 2003 that promotes biodiversity conservation by enabling people to co-exist with gorillas and other wildlife through improving animal health, community health and livelihoods in and around Africa's protected areas and wildlife-rich habitats. Following a fatal scabies disease outbreak among the critically endangered mountain gorillas that was traced to marginalised human communities living around the protected gorilla habitat, CTPH developed a One Health approach to biodiversity conservation that addresses human, animal and environmental health together. CTPH's programmes began at Bwindi Impenetrable National Park in Uganda, home to just under half of the world's mountain gorillas. The One Health model has improved community health and contributed to a reduction in human-related morbidity and mortality in gorillas. This model has also improved community attitudes to conservation, and led to better protection for gorillas on community land. CTPH built upon this One Health model to mitigate the impact of the COVID-19 pandemic, working with the Uganda Wildlife Authority (UWA), NGOs, tour operators and community groups to prevent transmission of COVID-19 between people, and from people to gorillas; they have also improved community livelihoods in the absence of tourism through Gorilla Conservation Coffee – a social enterprise that supports farmers living around habitats with gorillas. CTPH is promoting responsible tourism around great apes in Africa; and through organic expansion, training and advocacy, this model – which is addressing 11 out of the 17 Sustainable Development Goals – is being expanded to biodiversity hotspots to prevent and better control disease outbreaks, as well as address climate change. CTPH is advocating integrated approaches to achieving a planet in balance through a book – *Walking with Gorillas* – about Dr Gladys Kalema-Zikusoka's conservation and leadership journey shaped by One Health.

Climate change and southern African birds: 15 years of the Hot Birds Research Project

Andrew McKechnie[1] and Susie Cunningham[2]
[1] University of Pretoria, aemckechnie@gmail.com
[2] University of Cape Town

The rapid advance of anthropogenic global heating is exposing birds and other wildlife to more frequent and intense heatwaves, with far-reaching consequences for their survival and breeding success. Beginning at Tswalu in 2009, members of the Hot Birds Research Project (HBRP) have documented a plethora of negative effects of hot weather on avian fitness, involving both sublethal fitness costs of sustained heat exposure and lethal effects of extreme heatwaves. Focus areas have included the consequences of behavioural trade-offs between heat dissipation and foraging during hot weather, physiological mechanisms responsible for variation in heat tolerance among taxa, and the importance of microsites as thermal refugia. Since our initial behavioural and physiological studies at Tswalu, our research programme has expanded to include biophysical modelling, remote sensing, the integration of humidity and temperature in risk assessments and direct interventions to modify the availability of cool microsites.

Session 2

Conservation insights drawn from a millennium of grazing dynamics at Hluhluwe-iMfolozi Park, South Africa

Abraham Dabengwa and Marion Bamford
University of the Witwatersrand, Abraham.Dabengwa@wits.ac.za

Rangeland grazing resources sustaining livestock and wildlife populations are vulnerable to ecological degradation from climate and poor management. Understanding herbivore interactions with ecosystems is essential for developing rangeland conservation policies. Dung fungal spores are considered good proxies for reconstructing herbivore biomass density and grazing intensity over long timeframes. Here, we examined dung spores, charcoal particles, elemental Zr:Rb and soil organic carbon in a borehole in Hluhluwe-iMfolozi Park, South Africa, to reconstruct herbivory, fire, erosion and soil carbon dynamics from ~2 200-1 200 years ago. Our findings suggest a critical transition from fire- to herbivore-controlled grassland 1 600 years ago, as evidenced by decreased charcoal and higher Zr:Rb ratios. Soil organic carbon initially declined, but gradually recovered. Combined dung spores indicated that grazing pressure over time saturated, but *Sporormiella* linked with herbivore biomass fluctuated. Our findings emphasise the need to manage the herbivore-fire-grass relationship because of potential tipping points and legacy effects.

Bending the curve of biodiversity loss: What are we trying to change?

Belinda Reyers[1,2]
[1] University of Pretoria, belinda.reyers@up.ac.za
[2] Royal Swedish Academy of Sciences

Many in our community are concerned that current approaches to conservation are failing to address the scale, speed and complexity of global biodiversity loss. Despite concerted and increasing efforts, extinction rates and other measures of biodiversity loss continue their worrying trends, even accelerating in many cases. These trends, together with the continued large-scale alteration of multiple ecosystem and earth system processes, point to the need for system-wide changes to bend the curve of biodiversity loss. Specifically, this presentation will explore recent findings on the underlying causes of these trends – the deep-rooted and interconnected patterns that influence and reinforce the drivers of biodiversity loss. It will focus on one of these underlying causes – our views on the relationship and (dis)connection between people and nature, and how these views have evolved over time in global conservation science. Highlighting a newly emerging framing of "people with nature" – an inextricably intertwined perspective on people-nature relationships – points to new directions for our community to improve and reimagine degraded people-nature relationships. It also makes this a more collaborative (and less isolated) goal, drawing conservation into novel collective processes, and restoring and rewiring people-nature and people-people connections in ways that benefit nature and people.

Navigating the green dilemma: Stakeholder-driven research priorities to curb biodiversity loss in South Africa's green energy transition

Merlyn Nkomo[1], Megan Murgatroyd[1,2], Samantha Ralston-Paton[3] and Arjun Amar[1]
[1] University of Cape Town, merynomsa@gmail.com
[2] HawkWatch International
[3] BirdLife South Africa

This project sought to delineate picoplanktonic communities in the Benguela Upwelling System using genomic data from the Mission Microbiomes Expedition undertaken during May 2022. Picoplankton (0,2-3 µm) comprise the archaea, bacterioplankton and picoeukaryote groups, and are involved in several critical marine processes. Samples were collected from St Helena Bay (southern Benguela, seasonal upwelling), Walvis Bay (northern Benguela, semi-permanent upwelling) and Lüderitz (intense, permanent upwelling). Samples were taken inshore on the continental shelf, offshore and at various depths to document microbial community fluxes related to water mass type and upwelling stages. Micro-organisms were isolated using size-fractionated filtration, and genomic DNA sequenced on the Illumina Novaseq 4 000 platform. Sequences were quality-filtered, trimmed, co-assembled and mapped. Contigs and indexed BAM files were analysed using the Anvio Metagenomic Workflow to create a contigs database for resolving microbial taxonomy and function. This analysis, combined with physico-chemical water column metadata, enhances our understanding of microbial roles at various depths in these environments.

Soil fungal diversity of Tswalu Kalahari Nature Reserve based on high throughput sequencing

Eduard Venter[1] and Adriaana Jacobs[2]
[1] University of Johannesburg, eduardv@uj.ac.za
[2] Agricultural Research Council

Fungi are an extremely diverse and abundant group of microbes and are particularly important, having an impact on human, plant and animal health and the functioning of natural ecosystems. Despite making up 25% of the world's biomass, they are some of the most overlooked organisms, with more than 90% of the estimated 3,8 million fungi in the world currently unknown to science. During the current soil survey, an integrated approach was used to sample across the Tswalu Kalahari Nature Reserve. From these soil samples, environmental DNA (eDNA) was extracted and analysed using the ITS region, that is, the most widely sequenced DNA region in the molecular ecology of fungi and the chosen barcode gene region. The metabarcoding data that was generated provided the opportunity to produce a representative fungal microbiome dataset that is the first for the Kalahari bioregion. This data will be further compared with that obtained across the grassland biome of South Africa, and this forms part of a DALRRD-funded project on soil fungal diversity in South Africa across different land uses.

An energy flow view of terrestrial ecosystems

Yadvinder Malhi
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All life on Earth is connected by flows of energy, and analysis of energy flow can be a useful way of understanding ecosystems across taxa and habitat types. Despite having a long history in ecology, in recent decades energy analysis has rarely been applied in terrestrial ecology. In this talk, I illustrate how energetics analysis can give valuable insights and open novel analyses of the relationship between ecosystem health and disturbance. I draw on examples from old growth and logged rainforests in Borneo, tundra in Greenland and savannas in Africa. I then explore how energy flow analysis can be scaled from site studies to whole regions, illustrated with estimates of energy flow across all of sub-Saharan Africa. Energy flow can provide a powerful tool to connect biodiversity data to ecosystem function at the scale of region, continent or planet, and also to bring animals along with plants into global biosphere modelling.

Seasonal variation and drivers of parasite prevalence in migratory Serengeti wildebeest

Gareth Hempson[1], Juan Morales[1], Thomas Morrison[1], Grant Hopcraft[1], Michael Anderson[2], Eileen Devaney[1], Jason Donaldson[3], Vanessa Ezenwa[4], Ricardo Holdo[5], Ramadhani Mohamed[1], Jennifer McIntyre[1], Peace Sabuni[6], Basil Senso[1] and Aidan Trentinus[6]
[1] University of Glasgow, gareth.hempson@glasgow.ac.uk
[2] Wake Forest University
[3] Duke University
[4] Yale University
[5] University of Georgia
[6] Tanzanian Wildlife Research Institute

Gastro-intestinal nematodes (GIN) are a ubiquitous parasite group infecting ruminant herbivores that typically impose non-lethal effects on their hosts. Nonetheless, parasite effects on body condition and movement capacity should scale up to influence population demographic rates. Migratory populations may be at particular risk from GIN effects, because migration supports high population densities and incurs movement costs, yet may allow escape to "clean" areas. Here we examine longitudinal GIN prevalence in 54 GPS-collared female migratory wildebeest in the Serengeti via faecal egg counts (n = 465) obtained over 27 months. This data was analysed using mixed-effect and movement models (HMM; iSSA) to assess seasonal variation and drivers of parasite prevalence in migratory wildebeest. GIN burdens increase when wildebeest movement slows in seasonal ranges, and decreases during migration. Calving initiates a strong positive feedback on GIN burdens, as females aggregate, move less and become immunosuppressed. Together, these analyses reveal GINs to have seasonally varying effects on herbivore body condition, shaped by movement, habitat selection and possibly interaction with fire.

Session 3

Advancing One Health through the African Microbiome Project

Thulani Makhalanyane
Stellenbosch University, tpm@sun.ac.za

The "One Health" concept emphasises the interconnectedness of people, animals, plants and their environment. Microbial communities play essential roles in ecosystem and human health. While these interconnections are increasingly acknowledged, relatively few studies have focused on the central role of microbiomes. As a result, we lack mechanistic insights into how microbial communities function across diverse ecosystems. Given their known importance and the emerging evidence that microbiomes underpin all United Nations Sustainable Development Goals (SDGs), it is critical to advance our understanding of these communities in both natural ecosystems and host-associated environments. In this lecture, I will discuss our work on microbiomes across a range of ecosystems, including ecologically extreme environments such as the Southern Ocean. I will highlight how next-generation sequencing technologies have deepened our understanding of microbial diversity and functional potential. Drawing on our studies of gut microbiomes in urban and rural populations, I will illustrate the central role of microbial communities in advancing One Health.

Evaluating cheetah reintroduction success: A comparative study of two reserves in KwaZulu-Natal

Dorette Pretorius and Kelly Marnewick
Tshwane University of Technology, dorettepretorius@gmail.com

Cheetah (*Acinonyx jubatus*) reintroductions into fenced reserves are critical for species conservation in South Africa, yet success varies widely between sites. This study compares cheetah survival and introduction outcomes in Hluhluwe-iMfolozi Park (HiP) and the Mun-Ya-Wana Conservancy (MC), two ecologically similar reserves with contrasting cheetah management histories. Using Kaplan-Meier survival analysis and a custom introduction success model, we assessed the influence of predation, prior predator exposure, sex, age and social structure on post-release outcomes. Results revealed that while HiP has lower predation rates, it struggles to sustain self-sufficient populations, requiring repeated supplementation. Conversely, MC experiences higher mortality – largely from lions – but contributes significantly to the national metapopulation through successful introductions and translocations. These findings underscore the need for site-specific, adaptive management strategies and highlight the value of integrating short- and long-term success indicators to inform ethical and effective cheetah conservation.

Evaluating conservation corridor success for rare and common dragonflies using zeta diversity

Gabriella Kietzka, Cang Hui, James Pryke, Rene Gaigher and Michael Samways
Stellenbosch University, gkietzka@sun.ac.za

Conservation corridors connect natural areas, helping counteract land transformation. Yet, their impact on biodiversity is not well understood in terms of species turnover. We used the zeta diversity framework to assess dragonfly assemblages in natural grasslands and corridors within a plantation landscape. The method compares species across multiple sites, considering both rare and common species. Of the 37 species recorded, one was unique to natural areas, while four were exclusive to corridors. Stochastic processes influenced dragonfly populations more than environmental gradients. Species richness was higher in corridors and decreased with increasing shade cover. While factors like distance between sites, differences in water temperature, dissolved oxygen, shade and rock cover affected species turnover, they explained little about turnover variation in rare and common species. Corridors and invasive alien vegetation did not disrupt species turnover, indicating that corridors function similarly to natural habitats. Our findings highlight corridors as valuable tools in supporting dragonfly diversity, and the zeta diversity approach as a useful way to evaluate conservation strategies.

Biological responses to climate and land use changes in the KwaZulu-Natal rivers

Lwandile Ngozi[1], Matthew Burnett[2] and Colleen Downs[1]
[1] University of KwaZulu-Natal, 217052416@stu.ukzn.ac.za
[2] Institute of Natural Resources

Freshwater ecosystems have been vital in supporting human livelihoods since ancient times. To this day, anthropogenic factors continue to exert a global impact, primarily with reference to pollution, water abstraction and the construction of physical barriers in rivers. Achieving Clean Water and Sanitation (SDG 6) remains a significant challenge in African countries, including South Africa, where infrastructure failures, inadequate legislative implementation and sporadic pollution events have degraded freshwater environments to unacceptable levels. Traditionally, the monitoring of freshwater environments has focused on abiotic indicators of water quality. However, in this study, we employ biomonitoring techniques, using macroinvertebrates, fish and diatoms as biological indices. With the monitoring of biological responses, our study aims to contribute valuable data for holistic river management, offering valuable insights into the overall health and functioning of freshwater ecosystems amid changing climates and land uses. The study is assessing 52 sites surveyed during the drought period of 2014 to 2016, comparing them with conditions following a period of optimal rainfall.

Burning for carbon: Fire, afforestation and soil organic carbon dynamics in South Africa's Afromontane grasslands

Lindokuhle Dlamini[1], Elmarie Kotzé[2], Gregor Feig[3], Jean Lévêque[4], Olivier Mathieu[4] and Mathieu Thevenot[4]
[1] Rhodes University, lindokuhle.dlamini@ru.ac.za
[2] University of the Free State
[3] South African Environmental Observation Network
[4] Université de Bourgogne-CNRS

Afromontane grasslands in South Africa's high-rainfall mountain regions co-evolved with fire, support high biodiversity, provide key ecosystem services and store substantial soil organic carbon (SOC). Afforestation, proposed as a climate solution, may alter fire regimes and SOC dynamics. This study used Cathedral Peak Research Catchments to assess how (i) fire-exclusion-driven afforestation and (ii) post-*Pinus* plantation grassland degradation impact SOC storage, origin and reactivity. For (i), a fire-excluded afforested site and an adjacent, periodically burnt grassland were compared. The grassland had higher topsoil SOC and microbial activity, while $\delta^{13}C$ showed that over 40% of subsoil SOC in the afforested site originated from C4 grasses. This site also emitted more CO_2 and had twice the Q10 compared with the grassland. For (ii), wildfire-induced degradation led to accelerated erosion and SOC loss and redistribution, with twofold SOC, active C and microbial activity in depositional zones compared with the natural grassland. This study cautions against afforestation in fire-adapted grasslands and advocates the conservation of these diverse, SOC-rich Afromontane ecosystems.

Session 4 – Ministerial panel

Maxwell Gomera

Prior to being appointed as Resident Representative for UNDP South Africa and Director for the UNDP Africa Sustainable Finance Hub, Mr Gomera served in a similar role at UNDP Rwanda. He is a Resource Economist with over 20 years of experience in nature conservation and agricultural development. He has worked on economic development issues, including being part of a team that developed the "Global Green New Deal" for reviving the global economy and boosting employment in response to the financial and economic crisis of 2008. Max is a Senior Fellow of Aspen New Voices. He is an accomplished writer and has written for many outlets of national and global mainstream media. Max is married and has two daughters and a son – they all love Arsenal Football Club.

Hon. Bogolo Kenewendo – Minister of Minerals and Energy, Botswana

Bogolo Joy Kenewendo's career spans trade and investment, finance and development, and public policy. Kenewendo served as a Specially Elected Member of Parliament and Cabinet Minister of Investment, Trade and Industry in Botswana. She serves on various corporate and philanthropic boards, including as Chairperson of Bank Gaborone, and as Non-Executive Director of the Africa Free Trade Area Adjustment Fund Corporation and the Africa Center for Economic Transformation. She also advises governments and international institutions on trade and economic development policy. Kenewendo has served on the G7 Gender Equality Advisory Council, the United Nations Secretary-General António Guterres's High-Level Panel on Digital Cooperation, the Advisory Group on the gender architecture of the UN and the group on Financing for Development. She is also a member of the World Economic Forum (WEF) Trade Advisory Group, a member of the Global Future Council on Global Public Goods in the Fourth Industrial Revolution, and a WEF Young Global Leader. She is a Non-Resident Fellow with the Center for Global Development. She is frequently named among Africa's Most Influential People by various publications. In 2022, she was named among the prestigious *Time* magazine's TIME100 Next Honourees, highlighting 100 emerging leaders from around the world who are shaping the future and defining the next generation of leadership. The year 2024 set a different tone for Kenewendo and Botswana, as she was specially elected to be a Member of Parliament under the new administration and sworn in as Minister of Minerals and Energy.

Hon. Dr Rodney Sikumba – Minister of Tourism, Zambia

After graduating from the University of Zambia, Rodney Sikumba joined Professional Insurance Corporation Zambia Plc as a graduate trainee. In 2006, Sikumba joined Celtel Zambia Plc (now Airtel) as a Corporate Sales Executive. After completing his master's degree in the United States, Sikumba returned to Zambia and was appointed Head of Customer Experience for Airtel Zambia. In 2014, he was headhunted to lead Zamtel's Enterprise Department. He successfully managed a portfolio valued at US$22 million. In 2017, Sikumba established the Hult Investments Group of Companies (HIGC), whose portfolio includes Hult Ice, Hult Apartments, Hult Travel and Tours Limited (HTTL) and Hult Commodities. Sikumba joined UPND in 2001, the same year that his father was earmarked to stand as the party's first MP in Livingstone. In 2021, he stood for election as a UPND candidate for the first time and won. He has been Minister of Tourism since September 2021.

Hon. Jiwoh Abdulai – Minister of Environment and Climate, Sierra Leone

Jiwoh Emmanuel Abdulai, the Minister of Environment and Climate Change in Sierra Leone, supervises the Environmental Protection Agency – Sierra Leone; the Nuclear Safety and Radiation Protection Authority; the Sierra Leone Meteorological Agency; the National Protected Area Authority and Conservation Trust Fund; and the Forestry and Wildlife Division. He is leading the agencies and departments under his supervision to address environmental, forestry, conservation and climate change issues in the country through the development and supervision of appropriate policies and laws, aimed at building a climate-resilient environment that will support sustainable development and economic growth in the country. Minister Abdulai was the Co-Head of Professional Services at Broadway Technology, a leading provider of electronic trading solutions for interest rate and inflation markets worldwide, where for over a decade he led a global team of engagement leads and consultants to deploy and integrate enterprise electronic trading platforms for macro-economic desks at global investment banks. Mr Abdulai served as a Special Advisor to the Minister of Finance, Government of Sierra Leone, from April 2020 to May 2021. He worked with ministries, departments and agencies to design and roll out major government policies. He also helped coordinate the country's Economic Response Program for COVID-19. Mr Abdulai started his career in international finance as a Quantitative Strategist, modelling financial instruments for interest rate products, money markets and structured funding desks at Goldman Sachs International in London, where he served till 2008. From 2008 to 2012, Mr Abdulai was at the forefront of innovation in Sierra Leone's finance and financial technology space. He helped launch the country's first mutual fund and managed the operations of Splash Mobile Money, the country's first mobile payments platform.

Mr Abdulai holds a Master of Science degree in Econometrics and Mathematical Economics from the London School of Economics (LSE) and a bachelor's degree in Computer Science from the University of Texas in Austin.

Hon. Dr Evelyn Ndlovu – Minister of Environment, Zimbabwe

Dr Evelyn Ndlovu is currently the Minister of Environment, Climate and Wildlife. Formerly, until April 2025, she was the Minister of State for Matebeleland South, and prior to that held the role of Minister of Primary and Secondary Education in Zimbabwe. In July 2025, as Minister, she hosted the 15th meeting of the Conference of the Contracting Parties to the Convention on Wetlands (COP15) in Zimbabwe.

Alignment of interests: Transitioning from short-term philanthropy to permanent outcome-based capital through the reduction of frictional costs

Hon. Bogolo Kenewendo, Hon. Dr Rodney Sikumba, Hon. Jiwoh Abdulaia and Hon. Dr Evelyn Ndlovu

Environmental initiatives remain overly dependent on an altogether small pool of philanthropic capital and often exist at the behest of short-term interests and political cycles. This has led to a substantial gap between global environmental funding needs and actual commitments. To establish a sustainable and long-term financing environment aimed at filling this gap, it is essential to reform key frameworks so that scientists, policymakers and private capital can collaborate effectively to address the considerable challenges ahead. Climate solutions originate with policymakers, who have a responsibility to work with scientists to design forward-thinking conservation policies, communicate the opportunities and limitations they encounter in supporting scientific research, and work together in overcoming the obstacles in their way. Moreover, those with private capital also need to be included in this process. Throughout the conference, we have heard extensively from scientists and researchers about their successes and breakthroughs; this panel gives the opportunity to policymakers to outline how this science and research can be most effectively implemented within the framework of political and economic realities, and how we can tackle head-on the challenge of bureaucratic frictional costs.

Day 2: Thursday, 16 October 2025

Plenary: David Western

David Western, a PhD graduate of the University of Nairobi, began his research and conservation work in Amboseli in 1967, looking at the interactions of humans and wildlife. His work on human-wildlife interactions, unbroken since then, has produced many innovations, including community-based conservation, Parks Beyond Parks and Parks for Kenyans. Western, a former Director of Kenya Wildlife Service, also led Wildlife Conservation Society programmes internationally, chaired the African Elephant and Rhino Specialist Group, was Founding President of the International Ecotourism Society and was Founder of the African Conservation Centre in Nairobi. Western's publications include over 300 published papers and articles. His books include *Conservation for the Twenty-First Century, Natural Connections: Perspectives in Community-Based Conservation, In the Dust of Kilimanjaro, Kenya's Natural Capital: A Biodiversity Atlas* and, in 2021, *We Alone: How Humans Have Conquered the Planet and Can Also Save It*. He received the World Ecology Award in 2010 and a Lifetime Achievement Award for Ecotourism in 2012.

Session 1

Linking wildlife, conservation and people across landscapes

David Western[1,2] and Victor Mose[2]
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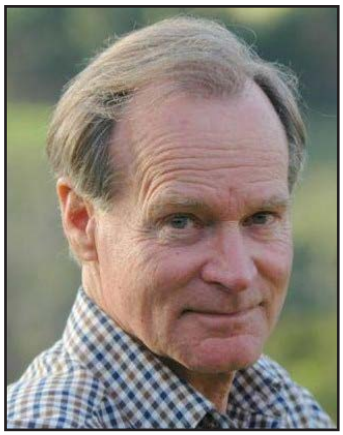
[2] African Conservation Centre



National parks are vital for protecting wildlife, but are far too small to conserve large mammals and biodiversity. Parks have also taken over community lands once shared with wildlife, and have offered few conservation benefits. How can conservation win space for wildlife beyond parks by engaging and improving the well-being of communities? The Amboseli Conservation Program's five decades of community engagement have secured open lands for migratory wildlife and pastoral livestock. The programme tracks wildlife, livestock and human activities using community resource assessors. The information is entered on digital platforms, transmitted by internet and automatically analysed and integrated with satellite imagery, using open-source software and artificial intelligence tools. Bulletins are posted to community and conservation agencies using simple visual graphics of rangeland conditions and pending threats to wildlife, livestock and human welfare. The community-based approach and conservation tools pioneered in Amboseli have been scaled up across the Kenya-Tanzania border and widely adopted internationally.

Moss bioindicators: factor influencing species diversity and community assembly along a rural-urban gradient in Madagascar's capital city

Antonio Razafindramboa[1,2], Lolie Ngolaharintsoa[1,2], Olivia Andrianjatovo[1,2], Patrick Ranirison[1] and Lovanomenjanahary Marline[2,3]
[1] University of Antananarivo, razafindramboaantonio@gmail.com
[2] Association Vahatra
[3] Harvard University

Urban ecosystems in tropical regions remain poorly studied despite their growing ecological importance. It is often observed that fewer organisms thrive in these disturbed environments, and groups of plants like bryophytes, due to their high adaptability, are often well represented. Sensitive to pollution and microclimatic variation, they are valuable bioindicators of environmental quality, though still underused in urban systems especially in Madagascar. This study investigates how bryophyte diversity, community composition and functional traits respond to microclimatic variation, pollution, and urbanization along a rural-to-urban gradient. Fieldwork will be conducted in Antananarivo, Madagascar, where 28 plots of 100m2 will be established. Bryophyte samples will be collected from all available substrates, along with associated environmental data. As one of the first studies of its kind in Madagascar, this research presents a first description of bryophyte diversity and community assembly in the urban context. It will further demonstrate bryophyte potential as indicators of environmental quality through community analysis and pollutant accumulation in moss cells.

Temminck's pangolin (*Smutsia temminckii*) habitat use in a dryland environment

Benjamin Melamdowitz[1], Wendy Panaino[2], Francesca Parrini[1] and Andrea Fuller[1]
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[2] Tswalu Kalahari Reserve

Habitat requirements for Temminck's pangolins remain poorly understood, despite pangolins being identified as a research priority by the IUCN Pangolin Specialist Group. This knowledge gap is a critical limit to the conservation efforts for this highly trafficked mammal. We have investigated the vegetation and habitat use of five Temminck's pangolins at two spatial scales within Tswalu Kalahari Reserve, a dryland environment: 1) landscape-scale analysis of vegetation characteristics in areas associated with pangolins to identify preferred habitat types, and 2) fine-scale assessment of plant communities, important for access to ants and termites. Our results highlight the environmental requirements that may limit pangolin distribution by showing the relationships between habitat quality and space use patterns. Understanding these environmental relationships could be used to inform habitat suitability for post-rehabilitation releases of confiscated pangolins from the illegal wildlife trade, ultimately providing evidence-based guidance for pangolin conservation.

Climate change and cyanobacteria: How construction of artificial waterholes can influence bloom potential in a semi-arid system

Laurene van Dijk, Andrea Webster and Andre Ganswindt
University of Pretoria, u19001852@tuks.co.za

As surface temperatures rise and rainfall becomes unpredictable due to climate change, wildlife, particularly in semi-arid fenced reserves, will become completely reliant on artificial water sources to meet their physiological requirements. As rates of animal visitation to water sources intensify, nutrients in and around water bodies will increase, creating ideal conditions for toxic blue-green algal blooms. This study assessed how waterhole construction influences water quality and temperature, sediment deposition and animal drinking behaviour in relation to the risk of toxic algal bloom formation. Results indicate higher soluble nutrient contents, more acidic conditions and higher water temperatures in larger, natural sediment-lined waterholes, which more readily support optimal bloom conditions compared with smaller, concrete structures. Zebra and warthog waded into the water to drink, contributing to nutrient loading, whereas lion and baboon were most at risk by drinking along the water's edge. This study highlights the importance of waterhole design in the conservation and management of endangered and economically important species.

Spatial and temporal gradient effects on ant and spider diversity in the Natal Midlands

Asande Hadebe, Rob Slotow, Sindiso Nkuna and Caswell Munyai
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Given the conservation value of riparian zones, investigating biodiversity patterns in these areas is essential. Longitudinal and lateral gradients create habitat heterogeneity, and riparian boundaries vary across taxa due to habitat needs. This study assessed spatial and temporal influences on ant and spider diversity in Wakefield and at other sites. Sampling covered 0-2 200 m along the river and 0-300 m into uplands during wet and dry seasons in South Africa's KwaZulu-Natal Midlands. A total of 7 302 ants and 1 987 spiders were collected, with higher abundance in the wet season. Species richness and foraging strategies differed between taxa. Notably, riparian zones did not support distinct ant and spider communities from uplands, though ant composition changed along the longitudinal gradient due to species overlap and replacement. These findings could help conservationists predict ecological shifts and develop strategies to sustain biodiversity and ecosystem functions in riparian zones.

White-browed sparrow-weaver structures as a resource for avian communities in the Kalahari

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Many species that are responsible for facilitating resources that drive distribution and abundance are underexplored, with very little experimental evidence characterizing the role of ecosystem engineers. White-browed sparrow-weaver structures are iconic features of the Kalahari. My thesis investigated how

the presence of these structures influenced avian communities in Tswalu Kalahari Reserve using bird counts in experimental studies, alongside temperature measurements inside and outside the structures. I performed a structure addition experiment in areas without sparrow-weaver structures to test their value. Generalised Linear Mixed Model analyses on structure additions showed a significant increase in bird abundance and Shannon diversity after the experimental structures were left in the plots for three to eighteen weeks. Temperature measurements showed that these structures provide cooler microhabitats, functioning as thermal refuges. This study highlights the ecological significance of sparrow-weaver structures in supporting avian communities under climate stress.

Wetlands provide a stable forage resource for ungulates in a variable Highveld ecosystem

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South African grasslands experience high inter-seasonal variability with patchy rainfall and extended dry periods. The survival of large herbivores in grasslands depends on their ability to respond to this variability. Functional resource heterogeneity, i.e., variation in the spatial and temporal availability and quality of resources, allows herbivores to respond through, for example, changes in habitat use. We hypothesised that wetlands would have greater resource availability and quality than grasslands during winter. We examined the spatial and temporal variation in vegetation quantity/quality through systematic seasonal monitoring of five 1ha wetland and grassland control sites. We measured vegetation biomass, crown cover and species composition and frequency. Preliminary spatial results show that, compared with grasslands, wetlands have higher biomass ($p < 0,0001$) and crown cover ($p < 0,0001$), with more stable species composition and frequency. Vegetation quality and habitat use data is being analysed. Combined, this could highlight the year-round importance of wetlands to herbivores, while reinforcing the need for wetland management in the grassland biome.

Legacy and emerging contaminants in an ecologically critical southern African river catchment

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Rivers sustain ecosystems and communities, but are increasingly contaminated by chemical pollutants. This study assesses the seasonal occurrence of micropollutants in the Crocodile River, an ecologically significant yet anthropogenically impacted system. Water samples were analysed for 22 metals, 274 pesticides and 21 pharmaceuticals using LC-MS and GC-MS. Pesticide testing in fish revealed bioaccumulation of banned chemicals DDT and DDE, with piscivores showing higher concentrations due to

biomagnification. Illicit drugs, including methaqualone (detected at 78% of sites) and cocaine metabolites, were prevalent near urban areas and wastewater treatment plants, reflecting removal inefficiencies. Persistent pharmaceuticals such as carbamazepine, diclofenac and sulfamethoxazole indicate pollution hotspots, with implications for antibiotic resistance and aquatic toxicity. This research highlights the urgent need for improved wastewater management to mitigate chemical risks to freshwater ecosystems and human health.

Session 2

Origins and invasion debt of Quilted melania (*Tarebia granifera*) (Lamarck, 1822) in Southern Africa

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Tarebia granifera is a freshwater snail from Asia (Thiaridae) that has become invasive in brackish and freshwater systems across Africa, North America, the Caribbean, Europe and Israel. First recorded in South Africa in 1999, it now occurs in KwaZulu-Natal, Mpumalanga, Limpopo and neighbouring countries. Its ability to release chemical deterrents against competitors gives it a strong advantage over native snails. This study assessed the potential expansion of *T. granifera* in South Africa using Species Distribution Models (SDMs) based on in-situ water quality, which indicated higher probabilities of occurrence in warm, low-turbidity systems, suggesting climate warming will further facilitate spread. In parallel, we analysed mitochondrial COI haplotypes to examine genetic diversity and introduction pathways. Results showed low diversity, consistent with a single introduction event in Southern Africa. Together, these approaches highlight the drivers of establishment and identify high-risk areas where targeted monitoring is critical to limit ecological impacts on native species.

African lions: Safe and sound?

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Despite their iconic status, African lions continue to face widespread threats across their range. While some protected areas, like the Kgalagadi Transfrontier Park and Etosha National Park, have demonstrated long-term population stability, these successes mask growing challenges at park boundaries – where lions frequently encounter conflict with people and livestock. Based on over 30 years of field experience across southern Africa, this talk reflects on the biological and political thresholds that define lion resilience. It explores why large, well-managed ecosystems can buffer lion populations against moderate losses, but also why that buffer is eroding under increasing edge effects, climate pressures and governance failures. The presentation draws from personal case studies and conservation research to question whether prevailing assumptions about "sustainable loss" are still valid. It highlights practical, proven solutions to reduce poaching and foster human-lion coexistence and calls for greater investment

in mitigating conflict – especially along park edges, where most lions are lost. Are lions truly safe and sound? Without renewed commitment to conservation beyond the fence line, their future remains uncertain.

Should wild animal welfare be considered in conservation?

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Animal welfare is of growing concern to many people and is being increasingly considered in policy decisions across the globe. While most current welfare regulations concern livestock, pets and sometimes farmed game, there is increasing attention on when and how they should be applied in wildlife use and conservation. This is a contentious issue: which species deserve welfare considerations and why? How important is it, given the suffering innately involved in animals' natural wild lives? Should lower welfare standards be acceptable if a form of wildlife use results in economic or conservation benefits? If welfare should be considered, how can it be evaluated? Here, we present a novel framework for assessing the sustainability of wild species use, which adds human health and animal welfare to the conventional three pillars of sustainability (ecological, social and economic). We also present research on the comparative welfare impacts of different forms of wild animal deaths, both natural and human-caused, which could help inform management decisions. These insights will help inform discussions and decisions around this increasingly important and divisive topic.

Applicability of Environmental Management Systems (EMS) for effective management of Transfrontier Conservation Areas involving Zimbabwe

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The Environmental Management System (EMS) of ISO 14001 has stood the test of time and is still being used in a broad range of systems for managing environmental issues and processes, and promoting environmentally responsible development in a proactive way. The principal aim of this research is to identify challenges limiting progress in Transfrontier Conservation Areas (TFCAs), examine the applicability of EMS ISO 14001 to address such challenges for the attainment of TFCA objectives, and progress towards shaping minimum standards for an Environmental and Social Safeguards (ESS) framework through survey-based research in TFCAs involving Zimbabwe. The importance of environmental protection is arguably one of the most important and pressing issues in modern society, and yet balancing developmental needs in the face of increasing standards and requirements for environmental stewardship is a challenge in modern society. The impacts of biodiversity loss, pollution and climate change are growing in their scale, scope and frequency, demanding innovation for the attainment of Sustainable Development Goals (SDGs). It is therefore crucial to find scalable solutions for the challenges facing noble area-based conservation initiatives such as TFCAs. The undisputed need for continuous improvement of the environment and protection of the delicate balance of nature continues to grow, despite current efforts

and the cocktail of options under legal and policy frameworks already existing. The Southern African Development Community (SADC) initiated the TFCAs, which can be viewed as crucibles for nurturing sustainable conservation and development. Despite their growing popularity in conservation circles at regional and global scales, many TFCAs are facing sustainability issues and unclear blueprints (at appropriate levels) for effective management/investment and even project execution standards. Over the years, several regional frameworks have been developed for TFCAs; however, harmonisation of standards and reference benchmarks remains outstanding. There is a need for a tailored approach to explore the applicability of the EMS framework in those important landscapes for desired objectives to be achieved. The widespread adoption of EMS represents a philosophical intent to provide a means toward achieving the goal of sustainable development. An important and timely question, therefore, is: to what extent (if at all), and under what circumstances, can this be achieved? How does the introduction of formal protocols under the EMS toolbox change the actual environmental and economic performance of TFCAs that adopt it, and to what extent do these performance changes affect sustainability and financing decisions in a world of scarcity and competing interests? In this research, we present the conceptualised framework and preliminary findings on TFCAs involving Zimbabwe.

Triggering rapid scaling of agroforestry: A case of 'The International Small Group and Tree Planting Program' (TIST) in Uganda

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Agroforestry and other regenerative farming practices could offer significant livelihood and ecosystem benefits, with the potential to improve the resilience of smallholder farmers with regard to climate change if widely adopted in appropriate landscapes. However, despite many efforts to promote their spread, adoption remains low across sub-Saharan Africa. We draw insights from The International Small Group and Tree-Planting Program (TIST) in Uganda, using qualitative and quantitative approaches to identify factors that support scaling, and key social leverage points for widespread adoption. Our findings highlight three key insights: (i) engagement of centrally positioned actors such as farmers to influence policy, norms and adoption, (ii) fostering of small groups to build social support systems, overcome resource access barriers and provide enabling conditions for adoption, and (iii) ensuring contextual understanding to identify leverage points and design interventions that reinforce adoption. Lessons from programmes like TIST could inform the design of future initiatives and accelerate adoption to improve livelihoods and ecological outcomes.

Morally contested conservation

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Wildlife conservation is a global priority, but exactly how to conserve wildlife is fiercely contested. High-biodiversity areas in sub-Saharan Africa are focal points for intense international disagreements. For example, disagreements rage over the role of hunting in wildlife management, the acceptability of militarised approaches to conservation, appropriate punishments for wildlife crimes, and whether conservation should prioritise the interests of people or the interests of wild animals. These ongoing

disagreements suggest potentially vast differences in values and worldviews between people who live in sub-Saharan Africa and people who live in the Global North. We compared perspectives on these controversial issues among more than 3 800 people living in rural and urban areas of sub-Saharan Africa, as well as rural and urban areas of the United Kingdom and the United States. Patterns in our results reveal areas of divergence and convergence that are more complicated than simple Global North-Global South divisions. Our results could help inform more equitable, inclusive, evidence-based decisions on some of the thorniest topics in international wildlife conservation.

Session 3

Assessing nitrogen dioxide in the highveld trophosphere: Pandora insights and TROPOMI Sentinel-5P evaluation

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NOx, particularly NO_2, are emitted through various industrial and transportation processes globally. The world's continuous economic development results in an increasing concentration of those gases in the atmosphere. Yet, there is scant information on the current state and recent evolution of these atmospheric pollutants over a range of spatial and temporal scales, especially in Africa. This study aims to fill the gap by leveraging data from a Pandora-2S ground-based, column-integrating instrument located in Wakkerstroom, Mpumalanga Province, South Africa, and from the space-based TROPOMI on board the ESA Sentinel-5P satellite. We compare these two spatially representative data sets, expecting that a significant positive correlation between the NO_2 tropospheric vertical column (TVC) data might justify using the global TROPOMI data as a proxy for tropospheric and boundary layer NO_2 concentrations over the Highveld of South Africa more generally. The data sets showed no significant difference between the interannual mean TVC-NO_2 in 2020 and 2021. The seasonal patterns were different in 2020, but in 2021, both measured peak TVC-NO_2 concentrations in late winter. Both instruments detected higher TVC-NO_2 concentrations during transitions between seasons, particularly from winter to spring. The TVC-NO_2 concentrations measured in Wakkerstroom, Mpumalanga, are mostly contributed to by the emission sources in the low troposphere.

Big data's big daddy! Aerial-born multi-sensor data collection beyond the curve!

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The Africa ASAP organisation has developed a high-performing, multi-sensing mechanism of exceptional capability that is flown under an airship platform, which is set to expand exponentially the scope of many fields of research, from ecology to biology, conservation and others – across disciplines, across

sectors and across borders. Data is collected through the neuromorphic sensing array, is analysed on board and can be programmed to be collected in real time and stored on hard drives. The resolution of the data collected is capable of identifying human-sized objects at distances of up to 17 kilometres – day or night, and through smoke, fog, smog and snow. Data collected may be of use in monitoring wildlife populations, anti-poaching, surveillance, planning urban settlements, detecting water, assessing the agricultural parameters of crops, preventing illegal logging, etc. The system will be demonstrated "on-screen" in a real-life demonstration of its capabilities during our presentation at the conference.

How doth the little crocodile

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Lewis Carroll's poem "How Doth the Little Crocodile" describes how the cunning crocodile lures fish into its mouth with a smile. Had Lewis Carroll only known that such virtue could lead to their demise! Crocodiles are ectothermic, and they have evolved physiological and behavioural adaptations that allow them to survive both extremely hot and extremely cold conditions. Cold spells affect their metabolism, and this may be one of the reasons for the mass pansteatitis mortality in the Olifants River Gorge. Binge-feeding on fish that concentrate during poisonous algal blooms in the gorge, followed by cold spells, has the potential to cause the stomach contents to putrefy. This hypothesis was tested by logging the stomach temperatures relative to the ambient temperatures of tracked crocodiles in the Kruger National Park. The results demonstrate previously undocumented thermal lags that mitigate temperature extremes and confirm their vulnerability to cold spells. Modelled climate data informs whether the cold spell prevalence was sufficient to cause the pansteatitis outbreak. While crocodile physiology increases their vulnerability, the mitigation of risk lies in reducing river pollution.

Improving AI for wildlife tracking: The value of expert tracker knowledge and training data

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[2] WildTrack Organisation

Artificial intelligence (AI) is widely used in wildlife conservation, but few guidelines are available to researchers to optimise data collection and interpretation. We will share how research work in Botswana has identified that expert trackers can improve AI models used to identify wildlife species from their tracks, building on the Footprint Identification Technology (FIT) developed by WildTrack. By combining the traditional knowledge of trackers with AI, we tested how different numbers of training images and model settings affect accuracy. Two expert trackers and one non-expert ranked the quality of track images for four species: black and white rhinoceros, blue wildebeest and giraffe. We found that AI models trained with input from expert trackers were more accurate than those using non-expert input. Our results highlight the importance of expert knowledge and careful selection of training images for developing reliable, non-invasive AI tools to support wildlife conservation, anti-poaching and management

efforts. This work provides practical guidance for researchers on data needs and resource planning for AI-based wildlife monitoring.

Ecophysiological responses and projected climatic suitability of Podocarpaceae in South Africa

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Podocarpaceae (podocarps) are ancient gymnosperms that persist in fragmented Afromontane forests across southern Africa, yet their future remains uncertain under rapid climate change. In this study, we combined experimental ecophysiology and species distribution modelling (SDM) to assess the persistence potential of four South African podocarp species (Afrocarpus falcatus, Podocarpus henkelii, P. elongatus and P. latifolius). In controlled conditions, seedlings of A. falcatus and P. henkelii were exposed to factorial combinations of heat and drought stress to evaluate species-specific responses. Both species exhibited physiological and morphological traits consistent with stress avoidance strategies, such as reductions in chlorophyll content and increased leaf shedding. P. henkelii maintained stable photosystem II activity and water use efficiency under drought, indicating a degree of resilience at the seedling stage. These findings were contextualised using ensemble SDMs under RCP 4.5 and 8.5 scenarios. While A. falcatus and P. latifolius showed relatively stable or expanding suitable habitat, P. henkelii and P. elongatus were predicted to lose substantial portions of their current range under RCP 4.5, with limited expansion under RCP 8.5. The integration of physiological performance with spatial projections reveals a mismatch between short-term stress tolerance and long-term habitat availability in some species. This highlights the importance of incorporating mechanistic traits into predictive models to understand podocarp responses to environmental change. This research informs us of the responses of podocarp species to environmental stress and how this may influence their distribution and potential persistence under current and future conditions. Mapping the distribution of podocarps and understanding the differences in their climate niches provide valuable insights into the potential climate drivers of podocarp persistence and their capacity for adaptation.

Session 4 – Panel discussion

Future Ecosystems for Africa: Lessons, impact and the path forward

Sally Archibald, Laura Periera, Odirilwe Selomane, Sènankpon Tcheton, Tatenda Gotore, Mohammed Armani, Kim Zoeller and Mulako Kabisa

Future Ecosystems for Africa (FEFA) works to ensure that efforts to improve biodiversity conservation and social well-being are informed by the best possible data in a way that captures the priorities and experience of African people. After five years of pioneering approaches to strengthen African voices in global conservation, this panel reflects on FEFA's journey and impact.

FEFA demonstrates what it means to do science differently in Africa through five interconnected themes: Futures Thinking, Guiding Policy and Investment, Ecosystem Functioning and Biodiversity, Implementation Projects and Nature Finance. These themes generate research activities across ten

implementation sites spanning eight countries that feed into seven strategic outcomes designed to systematically amplify each other's impact. This creates a cascading pathway where foundational principles generate research, research creates tools, tools enable implementation, implementation informs local and global policy, and policy strengthens African voices in international negotiations.

This session will showcase personal experiences from FEFA researchers across the continent and explore how diverse contributions have created collective impact. Through dialogue, visuals and reflections, we will examine FEFA's evolution from foundational principles to continental influence, demonstrating coordinated research that drives transformation at multiple scales. We also look forward to the second phase of our work (FEFA2), which will focus on driving novel economic paradigms and developing enhanced data-driven decision tools for the continent.

FEFA is a flagship joint initiative of Oppenheimer Generations Research and Conservation and Wits University.

Prof. Sally Archibald

Professor Sally Archibald works on understanding the dynamics of savanna ecosystems in the context of global change. Her work integrates field ecological data, remote sensing, modelling and biogeochemistry. Sally's research on global fire regimes has highlighted misunderstandings about the role of humans in altering patterns of fire, and has provided new tools for managing fire in conservation areas to promote biodiversity. Insights from her collaborative research into savanna ecosystem functioning is contributing towards better definitions of degradation in tropical ecosystems. Sally is on the advisory board of the Leverhulme Centre for Wildfires, Environment and Society and is the co-Chair of the SEOSAW steering committee. She is an Associate Editor for Ecology Letters and Trends in Ecology and Evolution.

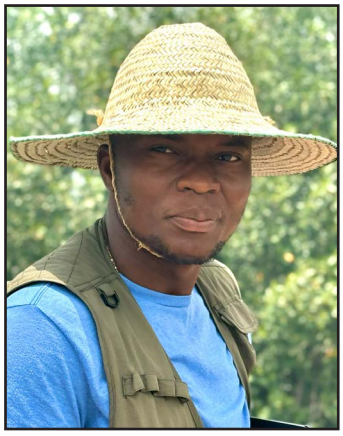
Prof. Laura Periera

Professor Laura Pereira is based at the Global Change Institute at the University of the Witwatersrand and is a researcher at the Stockholm Resilience Centre. She is an interdisciplinary sustainability scientist interested in the interface between traditional knowledge and innovation, and the role of future techniques in enabling transformative change and developing innovative methods for knowledge co-production in Global South contexts. Laura sits on the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES) Task Force for Scenarios and Models, and is also a member of the Earth Commission's Working Group 4 on Transformations.

Dr Odirilwe Selomane

Odirilwe Selomane is a sustainability scientist with expertise in agricultural and environmental economics. His research explores food system sustainability, the gap between policy ambition and nature financing, and metrics for strong sustainability. He has contributed to global science policy processes through IPBES since 2016, including as a coordinating lead author of the 2024 Nexus Assessment. He is a Senior Lecturer in Agricultural Economics, Extension and Rural Development at the University of Pretoria.

Sènankpon Tcheton



Sènankpon is a biodiversity conservationist with three years of extensive fieldwork experience in project implementation in ecosystem management, protection of endangered wildlife species and local communities' well-being in West Africa. He has a background in protected area management, conducting field activities and facilitating meetings with stakeholders and local communities. He holds an MSc in Sustainable Territorial Development, focused on supporting organisations in building a sustainable green living environment. Sènankpon is interested in the interface between indigenous knowledge and sustainability, and is passionate about actions to enhance the resilience of African ecosystems and the well-being of its communities.

Tatenda Gotore

Tatenda Gotore is a forest ecology and management researcher focusing on the sustainable harvesting of miombo woodlands. Tatenda's research looks at using a network of tree plot data to inform sustainable utilisation of miombo woodlands and is collaboratively supported by the Miombo Network and the SEOSAW Partnership. Tatenda is interested in exploring relationships between biomass accumulation and disturbance (human, fire, elephant) in miombo woodlands and their impact on biomass change, in order to optimise utilisation while considering biodiversity conservation and climate change.

Dr Mohammed Armani

Dr Mohammed Armani is a plant ecologist and sustainability expert at the Department of Wildlife and Range Management at the Kwame Nkrumah University of Science and Technology. His research interests span plant species and vegetation science; plant-herbivore interactions; people, nature and livelihoods; and sustainable agro-ecological practices in West Africa. Mohammed uses a combination of fieldwork, common garden experimentation, on-farm participatory research and data synthesis to provide insights into contemporary sustainable development issues in West Africa.

Dr Kim Zoeller

Kim is an interdisciplinary scientist with specific expertise in assessing how important interactions at different levels of ecological and social organisation contribute to human well-being and foster support for conservation and other forms of nature stewardship. As a Postdoctoral Fellow of FEFA, Kim is interested in understanding nature's contributions to people on the African Roadmap.

Mulako Kabisa

Mulako Kabisa is an ecologist specialising in environment and natural resource management. Her research interests are climate change adaptation, natural resource management, and gender and food security policy analysis in the agricultural sector. She is interested in bridging the gap between scientific and indigenous ecological knowledge, as well as science communication and public engagement on climate change issues.

Day 3: Friday, 17 October 2025

Plenary: Edwin Tambara

Edwin is a conservation practitioner with over 15 years of experience. He spent many years working with governments, civil society, local communities and the private sector at national, regional and continental levels in sub-Saharan Africa. He has led teams in conservation strategy formulation and execution. Edwin has supported and facilitated management, business and tourism planning for some of Africa's iconic protected areas and landscapes. As Director of Global Leadership, Edwin works at the nexus of government relations and strategic partnerships in Washington, D.C., engaging the U.S. and Canadian governments, NGOs and multilateral institutions, including U.N. agencies, the World Bank Group and the Global Environment Facility, to influence sound conservation policies and encourage development financing that supports conservation in Africa. Edwin joined AWF in 2013 as part of the Conservation Leadership Management Program. He holds an MBA from African Leadership University, a Master of Philosophy in Ecology and Conservation, and an honours degree in Biological Sciences from the University of Zimbabwe.

Session 1

Nature works: Turning Africa's wild side into wealth

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Africa's wild side is more than a postcard image – it's a powerhouse waiting to be unlocked. Imagine if, alongside agriculture and mining, every African nation published a Wildlife Economic Outlook – tracking how wildlife fuels GDP, jobs and community well-being. What if nature were no longer seen as a niche, but as one of Africa's great economic pillars? Today, wildlife already contributes billions of dollars and supports millions of jobs. With bold investment and enabling policies, its contribution could multiply. Yet, gaps in data, fragmented policies, limited technical capacity and narrow market access hold back this potential. Across the continent, sparks of success are lighting the way: Zimbabwe is building evidence and growth strategies, South Africa is pioneering enabling policy and investment platforms, and Rwanda is mobilising capital through master planning. These examples prove that small wins can scale into continental transformation. The frontier is clear: new tools, data and partnerships are rewriting how we measure, finance and grow wildlife economies. This is Africa's turning point – to transform nature's wealth into shared prosperity. Governments, investors and communities must see evidence-based decision-making to mainstream wildlife economies as engines of growth and resilience.

Stuck in a rut: Variation in reproductive behaviour, spatial patterns and endocrine activity in impala (*Aepyceros melampus*)

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Reproductive success is linked to how animals respond to environmental and social changes. To understand these responses better, this study assessed reproductive, spatial and hormonal activity in impala (Aepyceros melampus) during the pre-rut, rut and post-rut. In dominant territorial males, faecal androgen metabolites (fAM), faecal glucocorticoid metabolites (fGCM) and reproductive behaviour peaked during the rut. When dominant males were establishing territories during pre-rut, subordinate bachelor males had the highest fAM and the highest fGCM during the rut due to competition for females. As territories collapsed post-rut, bachelors increased their time with females and attempted to mate. This led females to increase their home ranges and use of space to avoid harassment. This study identifies factors contributing to reproductive challenges in a keystone species and underscores the ecological and social dynamics shaping impala behaviour, which may inform better management strategies. Therefore, reproduction cannot be viewed in isolation, but must be understood in the context of the surrounding environment to capture its dynamics fully.

Drugs, guns and eels: The decline of anguillid eels in East Africa and beyond

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The global decline of anguillid eels (genus Anguilla) presents a critical challenge to biodiversity. The complex and migratory life cycle of these eels, from their enigmatic oceanic spawning to their migration into and out of freshwater systems across the Western Indian Ocean (WIO) region, is still poorly understood. The ecological and economic importance of eels in East African communities and globally will be highlighted, noting their role in supporting food security, local livelihoods and cultural traditions. Recent eel population declines have been driven by multiple factors, including habitat degradation, overfishing and the obstruction of migration pathways, with these challenges further compounded by the illegal trafficking of glass and silver eels. The presentation will also investigate the intersection between eel exploitation and organised crime, where glass eels have become a lucrative commodity on international black markets. Particular focus will be placed on the threats to eel species in the WIO and other populations around the Indian Ocean, alongside potential conservation strategies to address the impacts of unsustainable fishing and trafficking.

Understanding climate change adaptation policy, barriers and readiness in South Africa

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[4] CSIR

South Africa has experienced floods, droughts and heatwaves that have affected water, food, health, infrastructure and ecosystem services. South Africa approved NCCRP and NCCAS to guide government and communities on climate actions. Several initiatives have led to government-wide adaptation policies. This study examines the adaptation policy landscape, barriers and solutions, and South African readiness. We ask: (i) what national climate change adaptation policies have emerged in the past two decades, (ii) what are barriers to adaptation policy, and (iii) what is the level of adaptation readiness in SA? We found that policy changes have created new frameworks, goals and processes, highlighting new funding and budget mechanisms. The climate adaptation policy is now more ambitious and stringent, requiring all levels of government to plan for change. Lack of funding, mandate, awareness, understanding and expertise are major barriers to adaptation policy. We found high adaptation readiness for climate change, but funding and leadership remain significant barriers due to their causal and multiplier effects on policy development, funding allocation, setting of adaptation agendas, and multilevel coordination of adaptation policy.

Smuggled hitchhikers: Ticks on trafficked pangolins and scales pose a hidden pathogen threat

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Beyond zoonotic concerns, pangolins may host ectoparasites like ticks, which can be moved through illegal trade and rehabilitation. Transcontinental movement of pangolins and their scales poses spillover risks to humans, wildlife and livestock. Despite this, studies on ticks infesting confiscated African pangolins are lacking. This study identified tick species from confiscated African pangolins and scales using morphological and molecular techniques. We collected 275 ticks from 17 rehabilitated pangolins and scales. A 16S rRNA fragment was amplified from representative ticks to assess diversity. Based on morphology and DNA, ticks were assigned to five species: Amblyomma compressum, *A. hebraeum*, *Ornithodoros compactus*, *Rhipicephalus theileri* and *R. simus*. DNA data revised *O. compactus* as *O. moubata*, likely due to misidentification at the nymphal stage. All three genera include vectors of pathogens causing heartwater, anaplasmosis, babesiosis, theileriosis, African swine fever and relapsing fever. This is the first report of *A. hebraeum* in pangolins and provides a baseline for tick identification in confiscated African pangolins and scales.

Thulamela: Gold, human burials and a forgotten African kingdom

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Thulamela was the capital of an African kingdom that flourished during the mid-second millennium AD. Research carried out in the 1990s, however, is incomplete and under-reported, and knowledge of the capital is largely assumed or based on published scraps of information. Our common rendering of the Thulamela capital borrows heavily and uncritically from research at what are thought to be similar state centres. Making matters worse, many of the golden items retrieved from burials were stolen in 2016. Thulamela remains an enigma. Our study re-engages the site and kingdom by reviewing work at the capital and revisiting the original trove of archives and finds from the initial excavators. These recordings are presently unpublished and, since the 1990s, have been stored in museum basements and private archives. This study lays the groundwork for future in-depth interdisciplinary research to shed new light on this neglected kingdom and the history of southern Africa.

Biophysical approaches to wildlife conservation: One year of interdisciplinary work

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Climate change threatens biodiversity by hindering animals' ability to balance energy and water budgets, influencing their behaviour, distribution, survival and ultimately fitness. Predicting the effects of changing environmental conditions is complicated by variation in animals' thermal tolerances, thermoregulatory behaviour and surrounding landscapes. The advancement of remote sensing technology, thermal drone technology and biophysical modelling provides a unique opportunity to overcome these challenges, investigate climate change effects across ecosystems and link them to biological outputs. Over the past year, this JWO-funded research has made substantial progress toward addressing these challenges by leveraging remote sensing, thermal drone imagery and biophysical modelling to investigate how climate change influences species across terrestrial and freshwater systems. I have focused on refining and integrating these tools to develop predictive models for assessing species' thermal vulnerabilities, with initial case studies spanning arid, semi-arid, fynbos and grassland landscapes. Preliminary models have started to link fine-scale thermal environments to physiological data on birds, bats and crocodiles, enabling us to explore how climate change may affect individuals, populations and communities. The techniques currently being developed in this research will be applicable to most wildlife species, and over geographical scales from regional to global. The continued work to fill this knowledge gap will enable us to highlight vulnerable wildlife species, habitats and areas needing conservation management and action, contributing to a sustained future for biodiversity. This research has broad implications for wildlife conservation and will shed light on the overall health of ecosystems.

Session 2

Dehorning reduces rhino poaching (based on research article recently accepted at the journal *Science*)

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Across 11 southern African reserves protecting the world's largest rhino population, we documented the poaching of 1 985 rhinos (2017-2023, ~6,5% of the population annually), despite ~$74 million spent on anti-poaching. Most investment focused on reactive law enforcement – rangers, tracking dogs, access controls and detection cameras – helping achieve >700 poacher arrests. Yet, we found no statistical evidence that these interventions reduced poaching (horn demand, wealth inequality, embedded criminal syndicates and corruption likely combine to drive even high-risk poaching). By contrast, reducing poacher reward through dehorning (2 284 rhinos across eight reserves) achieved large (~78%) and abrupt reductions in poaching using 1,2% of the budget. Some poaching of dehorned rhino continued as poachers targeted horn stumps and regrowth, signalling the need for regular dehorning alongside judicious use of law enforcement.

What evidence exists for the financial performance of wildlife-based land use in southern and East Africa

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The global biodiversity crisis has prompted international responses, with the Global Biodiversity Framework and UN Decade of Restoration establishing ambitious targets for conservation and recovery. Most remaining biodiversity is found in developing countries where sustainable development is the primary policy driver. The sustainable use of wildlife resources has been proposed to align conservation objectives with financial viability of wildlife-based land use (WBLU). WBLU in southern and East Africa provides an example of large-scale conservation and restoration using models that prioritise financial viability and livelihoods. The ecological and socio-economic outcomes of WBLU have been established and are not the focus of this review. However, the financial performance of WBLU remains under-explored in a systematic manner. This evidence review provides a structured approach to analysing the data available from private and community enterprises. The findings of this review will be of interest to public and private investors who have expressed interest in the spectrum of investment opportunities associated with ecosystem conservation and restoration under which WBLU falls.

Fire frequency and experimental warming changes soil microbial diversity in alpine grassland, South Africa

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Fire is an evolutionary and management tool shaping biodiversity and biogeochemical processes in grassland ecosystems. Experimental warming is used to study the effects of global warming, particularly in alpine ecosystems, where temperature is an important driver shifting soil microbial composition. This study explored the individual and interactive effect of fire frequency and experimental warming in a long-term experiment in the Maloti-Drakensberg Mountains, South Africa. A full factorial experiment was laid out in 1980 with four spring fire frequencies, annual, biennial, quinquennial and fire exclusion. Open-top hexagonal chambers were installed on the periphery of the fire plots in 2017. Once-off summer sampling was done in 2023 at a 10 cm depth, and sample DNA extraction was done using a Zymo soil extraction kit. Sequencing was performed using Illumina HiSeq 2000, targeting 16S (805R and 341F) and ITS (ITS4 and ITS1-5tag) regions.

Clicks and the climate crisis: Journalism's responsibility to deepen climate literacy

Journalism panel

As the media landscape fractures with news outlets competing for readers' limited attention, journalism faces a critical challenge: how to cover scientific breakthroughs in conservation with accuracy, depth and responsibility while still engaging a broad audience. This panel explores how journalists – not only climate specialists, but reporters across all beats – can craft compelling stories that deepen public understanding of research and conservation. How can journalists work to cut through the noise and provide readers with engaging and factual stories based on conservation around the world? How can scientific advances be translated into stories that feel relevant and immediate to everyday audiences? And in an era dominated by online metrics, how do we ensure that stories that matter get told? Panellists will discuss the role of accountability journalism and share strategies on how to move the public dial on conservation through storytelling that is both rigorous and emotionally resonant. This includes reporting that highlights not just crises, but solutions.

The potential of legume cover crops to improve soil acidity and nutrients in South African sugarcane fields

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We investigated how climate influences soil nutrients, pH and exchangeable acidity (EA) in South African sugarcane plantations, and assessed soil responses to selected legume species. Sugarcane, a drought-sensitive crop, is especially vulnerable during its vegetative stage under rainfed conditions. Random Forest models showed strong predictability for primary (P, N, K) and secondary (Ca, Mg) nutrients, with site,

total precipitation and elevation as key drivers. EA was well predicted (90,4%), while pH showed lower predictability (30,7%). Mixed Effects models revealed that legumes reduced soil N, P and K, with *Vigna unguiculata* doing so most strongly for N and P, and *Arachis hypogaea* for K. Conversely, Ca and Mg increased with four of six legumes, especially *Vicia villosa* and *Vicia sativa*. An inverse pH-EA relationship was observed, with EA lower in the KwaZulu-Natal Coastal Belt. All legumes reduced EA and increased pH to varying extents. *Vicia sativa* is recommended for improving soil fertility and pH under climate change.

Understanding the cognitive consequences of climate change in wild animals

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The rapid expansion of humanity's global footprint is a critical threat to biodiversity. In the Anthropocene, global surface air temperatures are rising rapidly – an effect predicted only to increase across the 21st century. Extensive research efforts have been dedicated to assessing the consequences of this change for wildlife. While impacts on the phenology, distribution and demography of wild animal populations are well documented, the impact of increasing temperature on cognition in these populations has, until recently, been largely overlooked. Understanding the cognitive consequences of climate change is crucial, as climate-induced cognitive impairment is predicted to have profound impacts on behaviour, reproduction and ultimately survival. Drawing on my research on multiple long-term study populations, I will outline the cognitive consequences of heat stress in wild animals, both in the short term and in the long term. Conversely, I will also illustrate the crucial role cognition plays in helping animals respond to anthropogenic change.

Estimating large carnivore densities using spatial capture-recapture in the arid Tswalu Kalahari Reserve, South Africa

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Large carnivores are experiencing significant range contractions due to anthropogenic pressures and increasingly depend on small, fenced reserves for protection. While fencing reduces human-wildlife conflict, it limits dispersal and can result in elevated population densities, necessitating accurate estimates to guide management. Such data is limited in arid regions, like in South Africa's Northern Cape province. In Tswalu Kalahari Reserve (hereafter Tswalu), we used a single-season camera trap survey and spatial capture-recapture (SCR) models to estimate the densities and abundance of leopard (*Panthera pardus*), brown hyaena (*Parahyaena brunnea*) and spotted hyaena (*Crocuta crocuta*). Estimated densities were 0,28 leopard/100 km^2 (±0,12 SE), 2,76 brown hyaena/100 km^2 (±0,46 SE) and 0,66 spotted hyaena/100 km^2 (±0,25 SE). The high density of brown hyaena suggests that Tswalu may serve as a source for metapopulation development and genetic supplementation. This study provides the first SCR-based density

estimate for spotted hyaena in the Northern Cape and addresses a key data gap. We recommend expanding camera surveys to surrounding private lands and conducting annual surveys at Tswalu.

Human-Centred Conservation: Communities at the core

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As conservation challenges become increasingly interlinked with broader social and environmental crises, Human-Centred Conservation (HCC) offers a necessary shift in approach – one that recognises Indigenous Peoples and local communities as the primary stewards of biodiversity. But for HCC to be truly effective, conservation must also break out of its silo and actively engage with other sectors. We must integrate conservation with frameworks for health, climate resilience, resource and land rights, food security and landscape-level planning. By embedding conservation into broader development and governance frameworks, we can develop more effective, scalable and inclusive solutions. As global policies grapple with trade bans, climate adaptation and biodiversity loss, this session will also consider how HCC can influence the international agenda. It argues for practical, inclusive and rights-based approaches that reshape conservation from the ground up, ensuring that the voices of those who live with and depend on nature are both heard and heeded.

Closing

Jonathan Oppenheimer

Jonathan Oppenheimer is a South African businessman, conservation philanthropist and social impact investor. He began his career at NM Rothschild and Sons, before moving to Anglo American and subsequently De Beers, where he held several senior management roles in southern Africa and London over two decades. He completed his education at Harrow School London and the University of Oxford, where he studied Politics, Philosophy and Economics. As Executive Chairman of Oppenheimer Generations, Jonathan is actively involved in all aspects of the family's private, commercial and thought leadership activities, including Oppenheimer Partners, Oppenheimer Generations Asia, Tswalu Kalahari Wildlife Reserve, Shangani Holistic and Oppenheimer Generations Research and Conservation. In January 2018, Jonathan joined the Board of Trustees of the Carnegie Endowment for International Peace (CEIP). CEIP is the oldest international affairs think tank in the United States and is committed to advancing the cause of peace through its global network of policy research centres.

Session 3

Community Science Roundtable

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National parks are vital for protecting wildlife, but are far too small to conserve large mammals and biodiversity. Parks have also taken over community lands once shared with wildlife, and offer few and limited socio-economic conservation benefits. How can conservation win space for wildlife beyond parks by engaging and improving the well-being of communities? The Amboseli Conservation Program's five decades of community engagement has secured open lands for migratory wildlife and pastoral livestock. The programme tracks wildlife, livestock and human activities using community resource assessors. The information is entered on digital platforms, transmitted by internet and automatically analysed and integrated with satellite imagery, using open-source software and artificial intelligence tools. Bulletins are posted to community and conservation agencies using simple visual graphics of rangeland conditions and pending threats to wildlife, livestock and human welfare. The community-based approach and conservation tools pioneered in Amboseli have been scaled up across the Kenya-Tanzania border and widely adopted internationally.

Poster session abstracts

Please note, poster abstracts have been ordered according to layout at the conference venue

1 Modelling livestock and wildlife herbivory intensity over space and time at the Shangani Ranch

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Dryland savannas are critical for both livestock production and biodiversity conservation, but these ecosystems face challenges like bush encroachment, driven by changes in herbivory patterns, fire suppression and climate variability. Here we model the intensity of herbivory over space and time at the 650 km^2 Shangani Ranch in Zimbabwe, using information on livestock and wildlife including cattle kraal metadata, historical cattle counts, aerial game counts and literature-derived biomass consumption rates. We are developing a reproducible R workflow to estimate kg of biomass consumed as graze and browse by wildlife and livestock. The modelling workflow is being refined with stakeholder input, and along with the findings will be shared via an open-access GitHub repository to support future research in mixed livestock-wildlife systems. This spatially resolved information on spatial-temporal patterns of herbivory pressure from wildlife and livestock should help us to better understand the spatial drivers of vegetation dynamics such as bush encroachment in this landscape, and thus contribute to linked activities to support more sustainable management practices.

2 Assessing the greenhouse gas emissions potential of extensive cattle production systems in Zimbabwe

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This paper explores the relationship between the Green House Gas Emissions Intensities (GHGEI) of extensive beef-dairy production systems from cradle to farm gate. The Life Cycle Assessment Tier Two IPCC guidelines method was used to quantify the greenhouse gas emissions from the extensive beef-dairy system. The results showed that GHG emissions per kilogram Fat and Protein Corrected Milk (FPCM) ranged between 0,28 and 8,11 kg CO_2eq per kilogram FPCM CO_2eq, with a significant decline in GHG emissions and increased animal productivity. Enteric methane is the highest (94,7%), nitrous oxide emissions are at 5,3% and transportation of feed is 0,003%. As such, enteric emissions are a key category that can be addressed by improving the feed quality (digestibility), consistency of supply, nitrogen and other nutrient balance, and adequate allocation per animal at different physiological stages. This will address the low productivity per animal and reduce GHGEI. This offers not only a pathway to satisfy

the forecasted increase in demand for milk and meat, but also a viable climate change adaptation and mitigation approach for sustainable intensification in the beef-dairy production system.

3 Transforming organic waste into agricultural resources: A circular economy model for agricultural food systems

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This study develops and validates a scalable circular supply chain model for organic waste management at a luxury ecotourism reserve in South Africa. By integrating animal-mediated waste conversion and Bokashi fermentation with vegetable cultivation, the model repurposes organic waste to replace synthetic fertilisers, thereby closing nutrient, water and energy loops. Industrial engineering techniques such as Material Flow Analysis, Value Stream Mapping and SWOT analysis underpin the framework, enabling a comprehensive evaluation of resource recovery and process efficiency. The expected outcomes include improved waste management practices, enhanced food production and a replicable model for remote, conservation-focused settings. Ultimately, the research contributes to reducing environmental impacts and promoting sustainable, regenerative agricultural practices in resource-constrained environments.

4 Effects of grazing systems on graze characteristics at Shangani Holistic Ranch, Matabeleland South Province

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This study investigates the effects of grazing characteristics on grass diversity and biomass within the Shangani Holistic Ranch, focusing on two distinct grazing management systems: Boma Kraal sites and Brush Kraal sites. Conducted in a grassland ecosystem, the research employs a systematic sampling approach to gather vegetation data from both kraal types and their respective control sites. Grass diversity is quantified using quadrat sampling and species richness indices, while aboveground biomass is measured by harvesting and weighing plant material from representative quadrats. Statistical analyses and t-test calculations were performed to compare grass diversity and biomass between the grazing systems. The results indicate no significant differences in grass diversity between Boma Kraal and Brush Kraal sites ($p > 0,05$). Conversely, a significant disparity in biomass was observed, with Boma Kraal sites showing lower biomass levels compared with Brush Kraal sites ($p < 0,05$). These findings underscore the importance of grazing management systems in shaping the ecological dynamics of grassland ecosystems, with implications for biodiversity conservation and land management strategies.

5 Effects of overnight kraaling on woody plants resprouting and grass parameters at Shangani Holistic

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This study investigated the impact of overnight cattle kraaling on woody plants and grass at Shangani Holistic over 12 months post-abandonment using the inside and surroundings of kraals. The goal was to see if kraaling correlated with tree density and grass production. Tree density inside kraals didn't significantly change based on abandonment time (12, 6 or 3 months). Resprout numbers per stump varied between kraals abandoned 12 and 3 months before versus 6 months before. Resprout height was greater inside at 12 months, greater outside at 3 months and similar at 6 months. Stump survival was highest in 3-month-old kraals, then 6-month, and lowest in 12-month-old kraals, with surrounding areas showing higher survival than inside. Overnight kraaling had no significant effect on grass biomass, species diversity or height. Grass basal cover was unaffected at 12 months post-use. However, it decreased inside kraals at 6 months and was lower inside than outside at 3 months. The findings enhance understanding of livestock-ecosystem dynamics, informing sustainable land use, biodiversity conservation and opportunities for future research with refined methodology.

6 Effect of genetically modified sugarcane in combination with sterile insect releases to control *Eldana saccharina*: A shade house trial

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The study aimed to investigate the synergistic effect of combining Bacillus thuringiensis (Bt) sugarcane with the sterile insect technique (SIT) for controlling *Eldana saccharina*. A survey was conducted on 12-month-old non-Bt (88H0019) and Bt sugarcane (GM CRY1A) grown in a treatment (SIT included) and control (SIT excluded) shade house. The study yielded limited results due to the inadequate data collected. However, based on the available data, some reasonable assumptions were drawn. SIT releases failed to reduce stalk damage significantly. However, a shared trend of significantly low damage was found on GM CRY1A sugarcane in both shade houses, demonstrated in the treatment with the lowest % stalk bored length (z-value = 6,70; p = 0,010), % internodes bored (z-value = 7,75; p = 0,006) and % stalk red length (z-value = 26,48; p < 0,001). The average *E. saccharina* infestation was low across both shade houses, but not significant (z-value = 2,96; p = 0,086). However, the 88H0019 sugarcane in the treatment had a significant (z-value = 4,42; p = 0,036) difference in infestation compared with the GM CRY1A. SIT has the potential to be more effective, but improvements need to be made in its application.

7 Impacts of land use changes on ecosystem services in an intensive agricultural area: A case study of Hippo Valley Estates

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Globally, land cover and land use patterns reflect the interaction of human activities with the natural environment. Land use change is one of the main factors driving ecosystem service changes. This has been achieved by altering ecosystem structures and functions. Land use change from natural systems to agricultural environments can be an obstacle for the sustainability of ecosystems and degrade their ability to provide services. This results in problems such as soil erosion and land degradation, which in turn seriously affects food production and food security, and threatens human health and regional ecological security. Human influence on land and other natural resources is accelerating at an alarming rate because of rapid population growth and increasing food requirements. The increasing agricultural intensity generates pressure not only on land resources, but also across the whole environment. In this case, sugarcane production in Hippo Valley Estates was identified as the main driving force causing changes in ecosystem services in that area, because of the growth in population and the demand for sugar in different parts of the world.

8 Extinction in translation: Replication, fragmentation and absence as strategies of visual display

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The global movement of exotic animals has long symbolised political power. This was especially evident in natural history expeditions, which built vast specimen collections. As an artist, I created a 2018 exhibition reflecting on these themes. *Freighted: 500 Years Of Rhinoceros Collection and Display* has toured between South Africa and Europe for seven years. Starting with Dürer's 1515 rhinoceros print – described as abconderfet, or an accurate copy of an absent original – the exhibition explores simulation and reproduction, which resonate deeply, as the rhinoceros, facing extinction, may soon exist only as a digital image. In 2025, I will launch a second travelling exhibition, this time centred on the pangolin. It, too, will reference historical natural history collections and examine the current threats to the species. This project began during a 2021 research associate trip to Tswalu and will first show in national museums before travelling internationally. This paper explores how mobility, replication and fragmentation function as visual curation strategies, and argues that they serve as powerful, effective methods of communication in the context of species extinction.

9 How distinctive features of Africa's ecology nurtured human origins

Norman Owen-Smith
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Geotectonics underlies the evolutionary changes leading to the emergence of early humans in Africa around two million years ago. They generated the high-lying interior, seasonal dryness and geological influences on eroding soils. Savanna vegetation forms predominate, supporting an abundance and diversity of medium-large grazing herbivores. These linked features promoted the evolutionary transitions making humans the most feared predator in Africa. This cultural legacy can best be preserved via a mosaic of protected and variably utilised areas.

10 Fossilised microfauna remains from Gcwihaba Caves: Preliminary results on taphonomical and palaeoenvironmental implications

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The Gcwihaba Caves in Botswana have yielded rich micromammal assemblages over the years that remain unstudied. Recent excavations during the Homini-Karst Botswana Research Project (2022-2024) resulted in additional fossils with better stratigraphic context. This study adopts an integrative approach combining taxonomic, taphonomic and palaeoecological analyses to reconstruct the Quaternary environmental conditions of the Ngamiland region. The material was excavated and recovered by dry sieving. The study methodology involves the sorting and classification of skeletal elements, species identification using craniodental anatomy, assessment of taphonomic alterations, and palaeoenvironmental reconstruction using various palaeoecological indices. Results will be compared with data from the study of large mammalian fauna to better understand site formation processes, depositional environments, the structure of the faunal community and the habitats in which fossil hominins likely lived.

11 Reconstructing the palaeoclimate of South Africa's Cradle of Humankind over the last 3,5 million years using machine learning and the mammalian fossil record

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Fossil fauna from palaeoanthropological sites can help reconstruct past climatic and environmental conditions when traditional proxies are unavailable. Such reconstructions help assess whether climate-induced dynamics influenced hominin evolution. Previous studies using fossil fauna from the Cradle of Humankind (COH), South Africa, have yielded diverse and sometimes contradictory results. We developed a novel quantitative palaeoclimatic reconstruction method based on Random Forest models,

using faunal presence/absence data as climate proxies. Applying AI to the fossil record requires overcoming data incompleteness and the lack of modern analogues. Our reconstructions of temperature and precipitation over the last four million years suggest relatively stable conditions, resembling those of the present-day COH. We find no statistical support for a shift from closed, humid to more open, arid environments over time, as frequently proposed. Instead, climate variability across sites likely reflects fluctuations in faunal community composition, whose temporal resolution may limit direct correlations with long-term palaeoclimatic records from southern African marine archives.

12 A multidimensional study of bearded vulture chick development

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Globally, vultures have been in rapid decline. The bearded vulture faces growing threats from habitat loss, poisoning and collisions with infrastructure, leading to critical declines in southern Africa. Captive breeding programmes offer hope for conservation, but stress in captivity can negatively impact chick development and delay reproduction. This study investigates the development and physiological stress of captive bearded vulture chicks by analysing eggshell calcium content, growth data and hormones as indicators. This multidimensional approach aims to improve understanding of stress physiology in bearded vultures and inform best practices for captive breeding programmes and conservation management.

13 A comprehensive overview of the avian DNA barcoding reference library in South Africa

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Illegal wildlife activities threaten South Africa's avian biodiversity, making accurate species identification crucial for conservation and law enforcement. Traditional morphological methods are challenged by species variation and similarities between species. DNA barcoding provides a reliable alternative if DNA barcoding reference libraries are available. This study generated a validated DNA barcode reference library using Cytochrome oxidase C (COI) and Cytochrome B (Cyt B) sequences from chain-of-custody voucher specimens, including 15 priority bird species targeted in illegal activities. Strict CoC protocols ensured data reliability for forensic use. The study generated 69 COI and 20 Cyt B sequences, covering 17,3% and 8,9% of South African bird species, respectively. Using phylogenetic analysis, all priority species were distinguished from their morphological look-alikes. Challenges included high intraspecific variation, low interspecific divergences, database gaps and outdated taxonomic nomenclature. This research highlights DNA barcoding's value for species identification, while emphasising the need to expand reference libraries to enhance accuracy in forensics and research.

14 Temporal drivers of collision risk at wind energy facilities for the endangered black harrier

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The black harrier is categorised as globally endangered and is at risk from collisions with wind turbines, especially in its breeding habitat. It is therefore critical to mitigate this challenge and minimise fatalities around infrastructure. The aim of this study is to identify the temporal drivers of black harrier flights and determine how they can be leveraged to maximise mitigation measures at wind farms. The distribution of raptors is strongly linked to the location of prey in terms of its abundance and accessibility. While climatic conditions are strong drivers of activity in avifauna, changes in the accessibility of prey may influence the spatial distribution of this activity. This study will evaluate how climate influences the activity of black harriers, as well as how changes in the landscape across seasons affect the distribution of prey species. Finally, the abundance of prey and its influence on the distribution of black harriers will be investigated. The study site is an operational wind farm and surroundings, and therefore this work will have direct practical implications for the conservation of this species.

15 The effects of localised habitat degradation in the Kalahari on the physiology and behaviour of white-browed sparrow-weavers (*Plocepasser mahali*)

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Piospheres are landscape features that have been studied mostly from a pastoral perspective since the early 1950s. There is a paucity of data on the ecosystem implications of these concentric degradation zones associated with watering holes. We hypothesise that piospheres limit food availability to birds that are restricted to small home ranges, and greatly reduce the availability of crucial microsites. We studied white-browed sparrow-weavers (*Plocepasser mahali*) at Tswalu Kalahari Reserve to determine the effects of piospheres on their physiology and behaviour. We determined how foraging and thermoregulatory behaviour, body condition and temperature, and microsite use vary at the heat of the day as a result of piosphere presence. We experimentally controlled surface water availability to account for the provision of water (intended for large game) in degraded piospheres. Preliminary data suggests that birds within piospheres show reduced body condition and elevated body temperature, and exhibit different foraging behaviour and microsite use. These findings provide evidence that desertification can disrupt energy balance in arid-zone birds and compound the effects of climate change in arid areas.

16 Learning to listen: Amplifying the voice of an endangered endemic frog as an indicator of montane wetland health

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The long-toed tree frog, *Leptopelis xenodactylus*, is an endangered species that occurs within a largely transformed landscape across the foothills of the southern Drakensberg and the KwaZulu-Natal Midlands. This region is characterised by its dramatic landscapes, where towering peaks give way to rolling grasslands, patchy indigenous montane forests and geomorphically unique wetland systems. It is these hummocky, dolomitic wetlands that *L. xenodactylus* is restricted to. Over the past century, these habitats have undergone significant transformation. The remaining habitat of *L. xenodactylus* is patchy, and occurrence of the species within suitable habitats is limited. Using cutting-edge technologies, including bioacoustics, fixed-point photography, drone mapping and wetland health assessments, our project builds conservation evidence against which to monitor the effectiveness of conservation management, such as wetland rehabilitation, the exclusion of grazing and wildlife-friendly fencing, and carries out research to understand more fully the species's habitat requirements and changes in population dynamics over time.

17 Evaluating the efficacy of eDNA metabarcoding for detecting and monitoring native and invasive freshwater fish in South African river systems

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This study assessed the efficacy of environmental DNA (eDNA) metabarcoding for detecting native and invasive fish species in South African rivers using a multi-marker approach targeting COI, 12S rRNA and 16S rRNA gene regions. Water samples from 15 localities across KwaZulu-Natal, Limpopo and Mpumalanga were analysed using high-throughput sequencing, generating 904 980 raw reads and 3 631 amplicon sequence variants (ASVs), with 359 ASVs assigned to fish. The COI marker had the highest detection efficiency, identifying 270 fish ASVs, while 12S rRNA and 16S rRNA detected 54 and 35 ASVs, respectively. The study successfully identified a diverse fish community, including nine invasive species, such as *Poecilia reticulata*, *Micropterus salmoides* and *Cyprinus carpio*. While species-level identification remains challenging (23% confidence), the results demonstrate the potential of eDNA metabarcoding for large-scale fish biodiversity monitoring in South Africa. Improved reference databases and species-specific primers are needed for enhanced taxonomic resolution.

18 Characterisation of phytochemical constituents and phytopharmacological activities of the South African freshwater medicinal plant *Cyperus laevigatus*

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Traditional medicine based on medicinal plants is the oldest and most common healthcare; nevertheless, scientific profiling is limited. *Cyperus laevigatus* is an aquatic medicinal plant used to treat diseases like oxidation stress. We aimed to explore the phytochemical composition and antioxidant activities of the aerial and root biomass of the South African *C. laevigatus* plant using solvents of various polarities. The aerial and root phytochemical profiles varied between solvents and plant parts, with the methanolic extracts containing more phytochemicals overall. *C. laevigatus* extracts show modest antioxidant activity, shown by DPPH and H_2O_2 scavenging tests and metal chelating activity. The ethyl acetate aerial extract had the highest antioxidant activity, with IC50 values of 34,29±0,36 mg/mL and 36,67±0,38 mg/mL for DPPH and H_2O_2, respectively. In contrast, the n-hexane aerial and root extracts were the strongest ferric chloride chelators. In conclusion, *C. laevigatus* harbours a diverse range of phytochemicals that work synergistically to elicit medicinal relief and has the potential to be a great addition to our arsenal against oxidation stress and disease.

19 Impacts of woody invasive alien plants on macroinvertebrates and stream flow regimes in the Soutpansberg Strategic Water Source Area

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South Africa is one of the driest countries in the world, and the Soutpansberg Strategic Water Source Area lies in a low rainfall zone. This area is of critical importance for supplying water to rural communities downstream. However, invasive alien plants (IAPs) threaten water security here. These plants reduce stream flow and disrupt important ecosystem services, which are key to healthy aquatic life and steady water supply. This review concluded that the general impacts of IAPs are well known and documented in literature. Studies show that IAPs along rivers can change the structure and diversity of macroinvertebrates and their feeding roles. They also damage ecological infrastructure and lower the benefits nature provides. While the general impacts of IAPs are well known, their effects on macroinvertebrates and stream flow vary by species and invasion scale. It is important for researchers, conservationists and managers to raise public awareness about the harm caused by invasive species.

20 Examining patterns of arthropod and plant taxonomic and functional diversity across the 100-year floodplain along the Umgeni River

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Floodplains are biodiversity hotspots and vital buffers against climate extremes, yet they are among the most threatened ecosystems globally. In South Africa, recent floods in KwaZulu-Natal highlighted the need to understand how biodiversity supports ecosystem resilience under growing environmental

pressures. The study investigates the taxonomic and functional diversity of arthropods and plants across a 100-year floodplain and adjacent uplands along the Umgeni River, with the main objective of identifying ecological and anthropogenic drivers shaping these communities. Research will be conducted at six sites, including Wakefields Research Farm, Hilton College Estate and the Msunduzi-Umgeni confluence, each reflecting different land use pressures. Sampling will occur at 0, 300, 600 and 900 m from the river, and at 0 and 300 m into upland zones. Vegetation will be collected using 1 m^2 quadrats along paired 30 m transects; arthropods are sampled with pitfall traps. Trait-based analyses will assess responses to land use, invasive species and habitat quality. Findings will inform conservation strategies by identifying habitat features that sustain biodiversity and enhance ecosystem resilience.

21 Plastic particles in pristine waters? Investigating microplastic pollution in natural springs of Southern Africa

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Microplastic (MP) pollution is a growing global concern, yet natural springs, often seen as pristine, remain understudied. This study assessed MP presence and characteristics in 43 natural springs across South Africa, including 21 peri-urban and 22 rural springs. Water samples were filtered onsite using stacked sieves (100-1000 µm). MPs were found in 93% of springs, with densities ranging from 0 to 38 particles/l. Contrary to expectations, the highest density was observed in a rural spring. Fibres (67,5%) and blue particles (28,8%) dominated, and the 100 µm sieve retained the most particles (48,3%). The detection of MPs in springs raises concerns for communities relying on them for drinking water and highlights ecological risks for aquatic biota. This first report of MPs in South African springs underscores the urgent need for monitoring and mitigation to safeguard these critical freshwater sources.

22 Trans-species accompaniment in conservation: A psychological perspective on the future

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The Nature Futures Framework is a heuristic that focuses on envisioning positive human-nature relationships. The tool is aimed at exploring plural perspectives when it comes to imagining transformative and desirable scenarios for people and nature. However, this method risks being anthropocentric, as humans and perceived needs are placed at the centre of the process of coming up with desirable futures, goals and visions that can inform conservation decision-making by humans for both humans and nature. This study aims to soften this limitation by exploring a complementary ecopsychology tool based on the "Council of All Beings", where participants are asked to step aside from their human identity and speak on behalf of another species. This has the potential to be both a psychological process of human deprivileging, as well as a perspective taking. In two workshops – one utilising the Nature Futures Framework and another incorporating the Council of All Beings process – we compare the depth and types of futures

that emerge. The results will describe the potential of incorporating trans-species accompaniment into conservation futures.

23 The use of electrodermal activity to examine the psycho-physiological effects of wildlife-based tourism

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Emotional arousal is a significant determinant of tourist satisfaction, yet studies on real-time psycho-physiological arousal in wildlife-based tourism settings have not been conducted. We used wearable electrodermal activity monitors to measure skin conductance levels (SCL) in response to wildlife sightings. In 2023, 12 South African residents participated in guided game drives in Pilanesberg National Park. Participants were fitted with wrist-worn EdaMove 4 sensors, and SCL was continuously recorded before, during and after game drives over three days. SCL varied according to species sighted, the novelty of the sighting, the proximity and behaviour of animals, and other tourists' behaviour at animal sightings. Significantly elevated SCL was observed during unique sightings of birds and reptiles, suggesting that novelty or rarity may drive emotional arousal. Our study demonstrates the value of psycho-physiological monitoring in wildlife-based tourism research, and provides a scalable method to quantify tourist experiences in situ, with implications for tourism management.

24 Perceptions on drivers of small-scale cropland abandonment vary across scales in South Africa's former homelands

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The scale at which one assesses perceived drivers of change in small-scale crop farming influences the resulting outcomes observed. Studies are required to consider scale to capture the spectrum of the drivers of cropland abandonment. This study examined people's perceptions of the drivers of small-scale cropland abandonment at household and community scale in former homeland areas of South Africa. Semi-structured interviews were used to collect data at household and community scale, involving a total of 215 households and eight focus group discussions in the Umhlabuyalingana (KZN), Mangaung (FS) and Joe Morolong (NC) local municipalities. The results showed that cropland abandonment is driven by environmental challenges, a lack of resources, demographic shifts, land tenure issues and changing farming practices. Multiple Correspondence Analysis (MCA) showed differences in perceived drivers at household and community scale, highlighting scale-dependent variations in observed perceptions. The results suggest that addressing cropland abandonment requires approaches that integrate household-specific needs and broader community-driven solutions to promote sustainable crop farming in South Africa.

25 Predicting the problem: Defining behavioural and anthropogenic factors that contribute to human-elephant conflicts in north-western Zimbabwe

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Human-elephant conflict (HEC) poses a major challenge to both conservation and community well-being in Zimbabwe and the broader KAZA region, where elephants increasingly compete with people over space and resources. Seasonal behaviour – crop raiding during the wet months and infrastructure damage in the dry months – intensifies this conflict. To support the Zimbabwe Parks and Wildlife Management Authority in mitigating HEC, this study investigates whether individual differences in elephant behaviour contribute to conflict frequency and severity. By identifying traits that make certain elephants more prone to conflict, we aim to inform more nuanced mitigation strategies. The research includes two components from early 2025: (i) behavioural observation of known problem elephants, and (ii) a questionnaire survey to gauge local attitudes toward elephant management. Findings will help develop targeted interventions based on elephant personality, improving coexistence strategies across varying risk contexts.

26 Understanding beneficiary expectations in South African National Parks's game loan programme

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The Wildlife Economy Programme (WEP), led by SANParks, aims to promote transformation, biodiversity conservation and sustainable livelihoods through game loans to emerging farmers. This study provides a baseline assessment by analysing SANParks's objectives and the expectations, preparedness and initial conditions of the 27 beneficiaries before receiving game. These foundations are essential to evaluating outcomes. Using thematic analysis, the study examines data from farmers' applications, including stated aims, infrastructure and operational activities. It also reviews SANParks's goals to assess alignment with beneficiaries' needs and plans. While most beneficiaries shared the vision of conservation and economic development, their preparedness and infrastructure varied significantly. Some had established operations; others lacked experience or resources, raising concerns about sustainability. By quantifying these baseline conditions, the study reveals gaps between SANParks's selection criteria and beneficiary readiness. These insights could inform future improvements to ensure better alignment between implementers and participants.

27 Mining for Wildlife

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Conservationists often regard mining as bad news for wildlife and the environment. Over 45 years the author has seen the benefits that mining can bring to wildlife protection and expansion of habitat. De Beers' created early wildlife protection areas near Kimberley which have been copied by other mining companies worldwide. Examples of the mutal benefit created by mining and the establishment of protected areas are given. The use of mining industry technology to protect and replenish as well as increase sustainability are explained for different areas of the world.

28 How should wild animal welfare be considered in conservation?

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Animal welfare is of growing concern to many people and is being increasingly considered in policy decisions across the globe. While most current welfare regulations concern livestock, pets and sometimes farmed game, there is increasing attention on when and how they should be applied in wildlife use and conservation. This is a contentious issue: which species deserve welfare considerations and why? How important is it, given the suffering innately involved in animals' natural wild lives? Should lower welfare standards be acceptable if a form of wildlife use results in economic or conservation benefits? If welfare should be considered, how can it be evaluated? Here, we present a novel framework for assessing the sustainability of wild species use, which adds human health and animal welfare to the conventional three pillars of sustainability (ecological, social and economic). We also present research on the comparative welfare impacts of different forms of wild animal deaths, both natural and human-caused, which could help inform management decisions. These insights will help inform discussions and decisions around this increasingly important and divisive topic.

29 A landscape-level analysis of the impacts of dehorning on rhino reproduction in southern Africa

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As a result of high and unsustainable levels of poaching, many sites across southern Africa have dehorned their rhinoceros (hereafter rhino) populations to reduce poaching incentives. To understand the potential implications of dehorning for rhino reproduction, we collated 20 years of rhino monitoring data (2004-2024) from 62 sites across South Africa, Namibia and Malawi. Using Bayesian regression models with random effects tailored to the data structure, we failed to find any significant effects of dehorning on rhino reproduction. Female age at first reproduction, calf survival, fighting-related deaths and inter-calving interval were very similar for dehorned versus horned rhinos for both white (*Ceratotherium*

simum) and black (*Diceros bicornis*) rhinos. However, sex was an important predictor of fighting-related deaths in black rhinos, with males having a higher probability of dying from fighting than females. These preliminary results are reassuring, considering the widespread use of dehorning; however, further analyses of other population dynamics parameters, including population growth rate, are needed.

30 A One Health framework analysis for sustainable game meat production and supply

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As the demand for game meat rises across southern Africa, ensuring its safe and sustainable production is critical. This study applies a One Health framework to analyse the sustainability of game meat production and supply in South Africa. It examines how animal health management, game meat safety and environmental practices interact to achieve safe, sustainable and legal meat. Interviews with 15 experts in the sector in South Africa identified key risks, governance gaps and coordination challenges and opportunities. A mixed-methods approach integrated these insights with an analysis of literature and policy documents. The study identifies ways in which game meat production and supply practices and systems can promote animal, human and environmental health. Notably, an application of the One Health principles can reduce zoonotic disease risk, enhance traceability, deliver safe game meat and enhance conservation outcomes. These findings promote safer game meat supply systems for game meat producers, processors and policymakers.

31 Beyond the photo: Insights from a wildlife citizen science project

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While citizen science is a valuable tool in conservation, little research explores what participation means to individuals. This study examined the knowledge gained and the personal value experienced by participants in photographic census competitions focused on African wild dogs and cheetah in the Kruger National Park. Using a quantitative design with qualitative insights, online surveys included open-ended questions to capture experiences. Three key questions explored knowledge gained, perceived contributions to conservation, and willingness to participate in future projects. Of the 101 respondents, 37% reported gaining knowledge about species behaviour, conservation status and population trends. Responses were categorised into six themes, with the most common being Feedback, Species-Specific Knowledge and Nothing Meaningful. Most participants felt a sense of purpose, suggesting that intrinsic motivations sustain engagement. However, many expressed frustrations over poor feedback from organisers, and some cited technological barriers. Findings highlight the need for effective communication, educational support and emotional connection to ensure meaningful and lasting participation.

32 Physiological stress-related response of orphaned elephants and individuals in a semi-captive herd during reintroduction

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Maternal loss due to poaching constantly increases the number of orphaned African elephants. Integrating orphans into established herds is an essential rehabilitation measure, as elephants are highly social and form strong bonds. Reintroduction programmes are trying to mitigate the effects of maternal loss, prioritising welfare of orphans and herds, but these programmes often lack a standardised approach. The stress experienced by orphans and herd members during reintroduction can offer insights into their health and well-being, but it remains understudied. This study investigates how different reintroduction phases affect faecal glucocorticoid metabolite (fGCM) levels in orphans and adult females in a semi-captive herd. Non-invasive faecal samples were collected from ten adult females and three orphans across three separate reintroduction events. An enzyme immunoassay is used to quantify fGCMs, offering insight into stress-related responses of orphans and herd females during reintroduction and its welfare implications. Understanding these responses is vital for successful integration and long-term species conservation.

33 Balancing the roll-out of renewable energy and conservation in South Africa: Spatial planning in a biodiversity hotspot

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South Africa has made commitments to increase conservation of its biodiversity and to decarbonise its economy – predominantly through the increased roll-out of renewable energy facilities. Generally, these competing land uses are incompatible, and systematic spatial planning is required to inform their placement optimally across the landscape. We have created a tool that uses best science to support decision making toward South Africa reaching its targets. We are using spatial data related to wind/solar resources, grid capacity, threatened species distributions, key biodiversity areas, protected area expansion plans and protected agricultural land maps to inform spatial plans, which we aim to make available as an online interactive tool. Key outputs of the tool are maps of low biodiversity sensitivity most suitable for renewable energy facility siting and areas most suitable for protected area expansion. Although currently limited in scope to South Africa, we aim to create a blueprint that will allow other countries in sub-Saharan Africa to conduct similar studies to ensure that the necessary increase in renewable energy roll-out does not come at the cost of the region's biodiversity.

34 Securing resilient futures: Programmes for collaborative conservation in protected areas – empowering women in rural communities

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Protected areas are vital for biodiversity, climate resilience and sustainable development. However, rural women face barriers to accessing conservation benefits, financial resources and decision-making roles, despite their leadership in environmental stewardship. This study examined women's role in conservation governance and how inclusive strategies support sustainable adaptation and community resilience. This research utilised a single case study qualitative approach, with Lake Mutirikwi Recreational Park stakeholders and Rukovo Topora community women. Individual semi-structured interviews, a focus group interview and a simplified nominal grouping technique were used for data collection. Data was analysed thematically. This study showed that women are marginalised from benefit-sharing programmes, limiting their conservation and economic efforts despite their being the backbone of rural communities. Recognition of hurdles highlights the critical need for gender-inclusive approaches that empower women in conservation, creating resilience in communities and protected areas and transforming them into collaborative spaces where biodiversity conservation and human well-being coexist.

35 Characterising southern African national park buffer zones

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Peripheral buffer zones safeguard protected areas, while allowing the incorporation of the community into conservation. However, buffer zones in southern Africa remain poorly understood and lack characterisation. To address this, we aimed to create an exploratory tool that allows conservation managers and planners to understand buffer zones in the context of the national park and the larger landscape. We reviewed the legislation of five southern African countries to determine whether they require buffer zones for their national parks, finding that only Mozambique and South Africa had this requirement. Using national park management plans, we characterised the buffer zones in terms of spatial characteristics, delineation methods and management objectives, based on the relevant legislation. From this analysis, we identified five basic spatial types of buffer zones, with multiple management approaches, situating the buffer zones within the specific contexts of their national parks. The typology described can be used by protected area stakeholders to determine a standardised approach to the application of the buffer zone on a regional scale.

36 Rethinking the role of researchers in creating pathways to human-wildlife co-existence

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The inclusion of managing human-wildlife conflict (HWC) and promoting coexistence in Target 4 of the Kunming-Montreal Global Biodiversity Framework marks a key shift in global conservation, recognising HWC as a challenge for biodiversity and human well-being. Overcoming this in African contexts requires participatory research to co-produce context-appropriate pathways to co-existence with local people whose livelihoods are tied to wildlife. Amid scrutiny of ethical practices and concerns over parachute science, guidelines on researchers' roles in co-production are essential. Applying knowledge of co-production principles, we highlight the need to build trust and address power imbalances by jointly establishing clear protocols on roles and expectations. Effective co-production begins with researchers and communities identifying problems together, and continues through co-reflection and shared interpretation. This approach fosters meaningful partnerships and a holistic understanding of conflict complexities, so that proposed pathways reflect the real contours of co-existence challenges.

37 Land use intensity reduces ant diversity and homogenises their communities in the city of Tshwane, South Africa

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Urban expansion threatens biodiversity and ecosystems. Urbanisation alters landscapes, impacting species assemblages and ecosystem functions. While land use change is known to reduce biodiversity, its effects on arthropods are less understood. Ants, as bioindicators, offer insights due to their sensitivity to disturbance and diverse ecological roles. This study investigates how land use intensity affects ant diversity in Tshwane, South Africa. Ants were sampled using pitfall traps across four sites over six months, representing a gradient from high to low disturbance: a schoolyard, a recreational park, a smallholding and a largely undisturbed site. Preliminary three-month data yielded 20 806 specimens from 31 species. The least disturbed site had the highest richness (S = 29) and diversity (H = 2,729), while more transformed sites showed lower richness and dominance by a few species. Though diversity differences were not statistically significant, trends suggest that urbanisation reduces richness and homogenises communities. These findings stress the importance of conserving urban biodiversity.

38 Macroinvertebrates as indicators of stream health in Telperion Nature Reserve, Mpumalanga

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Keeping rivers and streams naturally intact despite many threats, including anthropogenic activities, is crucial in sustaining ecosystems and human societies. Biomonitoring is a tool used to assess the health and ecological integrity of ecosystems, and macroinvertebrates (insects, snails, crustaceans and worms) are commonly used as bioindicators in rivers and streams. The upper Wilge River catchment is under pressure from various anthropogenic stressors, such as mining, agriculture, industrial activities, wastewater discharge and power generation. Though the macroinvertebrate assemblages and physico-chemical conditions of the Wilge River, into which the streams of Telperion Nature Reserve in Mpumalanga flow, have been studied and recorded by the Department of Water and Sanitation, these have not been studied in the Telperion Stream before. This study provides the first assessment of the macroinvertebrate assemblages within the Telperion Stream using the South African Scoring System version 5 (SASS5) methodology, and shows how these assemblages and physico-chemical properties change along the longitudinal profile of the stream and how these compare with those of the Wilge River.

39 Post-fire recovery of arthropod communities: Seasonal dynamics across a grassland regeneration timeline in the Natal Midlands

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Fire is an important and ongoing disturbance in ecosystems. The effect of fire on plants and animal communities is measured in terms of direct and immediate effects, short-term effects and long-term effects. In the School of Life Sciences, University of KwaZulu-Natal, Pietermaritzburg campus, I sampled ground-dwelling arthropods in a grassland five days, three months, nine months and 12 months after a fire. The study aimed to investigate the effect of fire on ground-dwelling arthropod communities. Ground-dwelling arthropods were sampled using a standardised pitfall trapping method in burnt and unburnt habitats. A total of 15 468 ground-dwelling arthropods comprising 163 morphospecies/species in 17 orders and four classes were collected from both habitats. The unburnt site had up to 59% of the total abundance, while the least number of individuals were collected from a burnt site. Fire generally affected the abundance and occurrence of arthropods across the two sites. Arthropod abundance in the burnt site was lowest seven days after the fire but peaked nine months after the fire, with the second-highest abundance observed three months after the fire.

40 Clean kills and dirty data: do preservation agents alter beetle isotope signatures?

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Stable isotope analysis (SIA) is a well-established tool in vertebrate research for describing trophic relationships, diet composition, nutrient assimilation, and disease transmission; yet its use in terrestrial insects remains limited. As such, the advantages, disadvantages, and broad applications of SIA in entomology are not well understood. Many insect studies rely on museum specimens often euthanised or preserved with agents that contain organic compounds—such as carbon and nitrogen—which may alter isotopic signatures and affect the reliability of SIA. To address this gap, we propose to evaluate the suitability of SIA for beetle tissues subjected to commonly used preservation methods, using lab-reared mealworm beetles (and later wild-caught dung beetles) as a model system. These agents include acetone, chloroform, diethyl ether, ethanol, ethyl acetate, Kahle's fluid (formalin), polypropylene glycol, saturated saline solution, and freezing. The trials will use beetle elytra—dead tissues with fixed individual larval isotopic signatures—to test the effects on $\delta^{13}C$ and $\delta^{15}N$ values. For each specimen, one elytron will be treated and the other used as a control.

41 A mound of possibilities: Termitaria as multifunctional microhabitats for diverse species

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Termitaria are recognised as ecological resource hubs, yet their role as behavioural microhabitats remains underexplored. A year-long camera trapping survey was conducted in Telperion Nature Reserve at termitaria with and without hollows to investigate species richness, composition and behaviour. Over 90 species were recorded, with significant differences in species composition between vegetation communities. Animals were observed feeding at, perching and grooming on, and scratching against termitaria – indicating use for foraging, potential thermoregulation and self-maintenance. Seasonal and diel patterns were observed in the use of termitaria, suggesting temporal differences in the ecosystem services provided by these structures. These findings highlight the ecological and conservation significance of termitaria as dynamic microhabitats within a grassland ecosystem.

42 Reducing the burden of scorpion stings in southern Africa: A novel approach

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This research presents a new and innovative science-based first response framework that addresses the burden of scorpion stings in southern Africa across all levels of society. This framework reduces the chance of being stung by a scorpion, and ensures the best possible outcome for stings in humans and animals. It has been developed by Jonathan Leeming.

43 Insect pollinators of avocado (*Persea americana*) in Africa: A systematic review

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Pollination is a vital ecosystem service supporting the production of, among other crops, avocado (*Persea americana*) – a key crop in Africa and globally. Yet, research on its insect pollinators remains limited. This systematic review synthesises findings from 15 peer-reviewed studies assessing insect pollinator diversity, role and efficiency in African avocado orchards. We aim to (i) identify the most abundant and efficient pollinators and how they vary across Africa, (ii) assess insect pollinators' impact on avocado pollination and yield, and (iii) evaluate how insect pollination can be enhanced for better yields. Key pollinators include honeybees, carpenter bees, stingless bees and blowflies, with carpenter and stingless bees showing higher efficiency. But research is being carried out in only four of the ten top avocado-producing African countries, exposing major local knowledge gaps. Climate variability threatens pollinators, stressing the need for adaptive management. Viable farming – like habitat conservation and low pesticide use – is advised to boost pollinator diversity and abundance. This review urges more research to bridge regional gaps and secure resilient pollination amid rapid ecological change.

44 Comparing leopard (*Panthera pardus*) population monitoring techniques: Baited vs standard camera trapping

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Accurate census data is important to make informed decisions regarding the management of wildlife populations. This is especially true for the target species, leopard (*Panthera pardus*), which is listed as vulnerable by the International Union for the Conservation of Nature (IUCN) Red List and the Red List of Mammals of South Africa, Swaziland and Lesotho. Leopards are inherently difficult to count due to the species's solitary and elusive nature. With the advances of modern technology, new surveying techniques such as camera trapping have emerged as powerful tools for inventorying and monitoring carnivores. An obvious approach to increasing the probability and frequency of adequate individual sampling is using bait at the camera sites. Therefore, the aim of this study was to estimate the effectiveness of baited camera traps (BCTs) as an alternative to standard camera trapping (SCT) in the monitoring of a leopard population in Limpopo, South Africa. We expected and observed, during the first phase of the study, the capture rate of the BCT survey to be higher compared with SCT.

45 The mystic tales of high altitude mammals: Endocrine insights of markhor (*Capra falconeri heptneri*) at Darjeeling Zoo, West Bengal, India

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Many high altitude mammals require urgent conservation attention under ex-situ conservation breeding programmes. Here, faecal endocrine correlates, progesterone and testosterone, were quantified to understand the reproductive biology of the markhor. Systematic faecal sampling (N = 206) was conducted from May 2022 to April 2023 at the Darjeeling Zoo. Captive markhor (Female = 3, Male = 2) enzyme immunoassays were used for hormone quantification and validation. The package hormLong was used to quantify hormone baselines for reproductive phases. We used standard non-parametric tests for all comparative analyses. Baselines for fP4M and fTM value ranges were 183-240 µg/g and 63-99 µg/g respectively, confirming the reliability of the assay. Monthly monitoring showed a six-month (Nov-Apr) gestation and parturition, and May-Oct was determined as the non-reproductive phase. Males' reproductive activity was characterised by significantly high fTM titres in Sep-Nov. Endocrinological information on markhor reproductive physiology has great potential for reproductive monitoring both in captivity and in the wild, thus ensuring necessary management interventions in captive breeding programmes.

46 Variations in space use by African savanna elephants within the Gonarezhou National Park landscape, Zimbabwe

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We investigated seasonal and sex differences in elephants' home range sizes, home range overlap and interaction with environmental variables. We also assessed the extent of elephant activity outside of GNP, and the role that season and diel may play in this, and documented habitat use by elephants outside of GNP, including in human-dominated landscapes. Differences in size of home ranges between sexes in all seasons were not significant. Both sexes had high site fidelity, retaining 60% of their home ranges between consecutive seasons. Males preferred vegetation types dominated by C. mopane, whereas females used more diverse upland vegetation types, preferring higher elevations than males over all seasons. Male elephants moved as far as 60 km from GNP, but females typically did not disperse further than 15 km. Most of the movement outside of GNP was during the cool-dry season, and both male and female elephants returned to the park during the hot-wet season. When outside the park, the male elephants utilised mostly forested land cover types, whilst female elephants remained in shrubland cover types and preferred areas with low human densities.

47 Integrating evolutionary constraints into conservation: Dietary adaptation and morphological limits in ruminants

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Sustainable conservation requires understanding of evolutionary constraints that shape species' ecological roles. In ruminants, morphophysiological traits – especially in craniodental and rumen anatomy – can constrain dietary niches and ecological flexibility. We tested for non-linear relationships between diet and 25 craniodental traits across 32 ruminant species, using multiple model fits in a phylogenetically controlled framework. We present results for two key traits. Firstly, muzzle width (MZW) increased linearly with grass intake (0,2037 cm per 1% grass), suggesting an adaptive response for bulk or ground-level feeding. In contrast, the Hypsodonty Index (HI) – reflecting molar enamel height – increased asymptotically, indicating that while extreme hypsodonty is not a requirement for grazing, the absence of this in species with abrasive grass- or sand-rich diets reduces competitive ability. Conservation planning – including translocation, stocking and feeding – must consider such evolutionary limits to avoid mismatches between morphology and local resources.

48 Contextual and individual determinants of quantity discrimination in African elephants

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African elephants (*Loxodonta africana*) possess advanced cognitive abilities, including numerical competence. However, the extent to which individual and contextual variables influence their quantity discrimination performance remains underexplored. In this study, I investigated how elephants' decisions in relative quantity discrimination tasks were affected by factors such as age, location, side preference and motivational state. Elephants were presented with quantity choices across multiple trials, and their learning trajectories and choice patterns were analysed over time. The findings of this study may potentially highlight the complex interplay between cognitive processes and ecological and individual variables, offering new insights into elephant decision-making. This research has implications for improving cognitive testing protocols and enhancing management.

49 African clawless otters (*Aonyx capensis*) and their food: How mercury and microplastics impact otter welfare

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Anthropogenic activity is the main source of mercury (Hg) and microplastic (MP) pollution in South African river systems, and negatively impacts water security, biodiversity and ecosystem health. Due to their high trophic position, African clawless otters (*Aonyx capensis*) can be used as bioindicators for monitoring pollution; however, this has not been applied in a South African context. This study assessed and

compared Hg and MP concentrations in the gut content and liver of fish, crabs and mussels in the Wilge River and correlated the results to concentrations measured in otter faeces. Using a previously validated test system, we also quantified faecal glucocorticoid metabolite (fGCM) concentrations as a biomarker for welfare in otters. Preliminary results indicate contaminant concentration differences related to trophic level in prey items and a corresponding increase in otter fGCM concentrations due to contamination in the diet. Findings from this study will contribute valuable insights related to the movement of MP and Hg through aquatic food webs and subsequent consequences of long-term impacts in top aquatic predators and ecosystems.

50 Density dependence in large herbivores inhabiting an insular nature reserve

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Both density-dependent and density-independent processes influence the temporal dynamics in ungulate population abundance. While studies often focus on density-dependent responses of ungulate populations to resource limitations at large spatial scales, the dynamics at small scales remain relatively unexplored. To address this gap, we investigated the temporal dynamics spanning 20 years of ungulate abundance in a relatively small dystrophic grassland ecosystem. We used annual counts and herd composition data for several species to assess the relevance of density dependence at the population level. We further attempted to link population trajectories to demographic mechanisms. Counts were corrected using a state-space modelling approach. The populations of most species increased from low densities to approximate equilibrium densities. Our findings thus suggest evidence of density-dependent responses in population growth. Additionally, juvenile-to-adult ratios exhibited patterns of density-dependent reductions in recruitment.

51 Tracking cheetah: Quantifying hunting success through an age-old tracking method

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In the face of human pressures, fences have contributed to the protection of wildlife in southern Africa. Many carnivore species can reach or even exceed their carrying capacity within these reserves, particularly from a lack of predation by missing key species, which can result in mesopredator release. This has been the case at Tswalu Kalahari Reserve, South Africa, where a drastic increase in their cheetah (*Acinonyx jubatus*) population over recent years has been observed. Following declines in herbivore populations, the majority of the cheetah were relocated to other reserves. To understand the dynamics of this species and its impact on the herbivores at Tswalu better, we have quantified their hunting success using a traditional tracking method to collect key data markers. By tracking cheetah spore through the Kalahari sand, we measured the distances over which cheetah walked and chased their prey, recording prey species, age, sex and the success rates of each hunt. This will allow us to further determine the energy spent and obtained during successful and unsuccessful hunts for a broader understanding of the cheetah's feeding patterns, which will help improve management strategies.

52 Mysterious, missing, or menacing: Untangling the drivers of local ecological knowledge of Laikipia's carnivores

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Carnivores play a dual role in ecosystems, providing essential services while also driving conflict with local communities. Their presence leads to diverse perceptions, influencing conservation outcomes and management decisions. While most research has focused on the negative impacts of large carnivores, little is known about their perceived benefits or how knowledge shapes attitudes across multiple species. Additionally, species-specific biases have hindered comparative analyses, limiting conservationists' ability to develop inclusive strategies. This study examines how communities in Laikipia, Kenya, perceive 16 different carnivore species, and whether existing knowledge predicts attitudes toward their future population management. Through structured interviews conducted across private conservancies, community-managed areas and mixed-use landscapes, we assess interactions, knowledge and perceptions of a broad carnivore guild. Results are pending, but this research will provide critical insights to inform conservation strategies that align with local perspectives, promoting co-existence and mitigating conflict in a rapidly changing landscape.

53 Ecological connectivity across a diverse land use system in Namibia's Kunene region using elephants as a proxy

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Elephants, as a wide-ranging species, are valuable proxies for assessing ecological connectivity across complex land use systems. This study analyses GPS tracking data from 26 collared elephants in Namibia's Kunene region during the first quarter of 2025. Collectively, the elephants covered 24 919 km, with significant movements recorded between protected areas, conservancies and private farms. Spatial analyses using Minimum Convex Polygon and Kernel Density Estimation revealed diverse home range sizes and seasonal variation in movement intensity. These findings underscore critical wildlife corridors and potential conflict hotspots, offering key insights for connectivity conservation and land use planning in the region.

54 Tails through time: Leopard population dynamics in the Little Karoo

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Knowledge of leopard (*Panthera pardus*) persistence over time in mixed-use landscapes is limited, particularly in semi-arid regions of southern Africa. This study aimed to estimate leopard population changes over time and to investigate possible drivers affecting density, using three camera trap surveys (2012, 2017, 2022) in the Little Karoo, Western Cape, South Africa. To our knowledge, this is the only multi-session spatial capture-recapture (SCR) analysis conducted in a semi-arid southern African environment

encompassing both protected and non-protected areas. The best-performing density model indicated that the leopard population remained stable, with a density of 0,92 leopard per 100 km^2 (95% CI: 0,74-1,16) over the study period. Terrain ruggedness was an important driver of leopard density, indicating that rugged, elevated areas are key leopard habitats within the region. This study shows that a charismatic species can survive in a mixed-use landscape abundant with anthropogenic threats. It further serves to highlight the value of multi-session SCR modelling in developing targeted conservation efforts.

55 Exploring elephants' function in shaping ecosystems

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The African savanna elephant (*Loxodonta africana* (Blumenbach, 1797)) may alter its environment, especially when its natural dispersal has been compromised. Elephants also may change vegetation structure (i.e., grass-tree ratios), particularly in areas of high elephant density. While elephants can negatively impact other species by transforming the landscape, they also contribute to shaping the savanna landscape to the benefit of other species. Here, we conduct a systematic literature review and meta-analysis to investigate the role of elephants in vegetation dynamics and habitat modification, and assess their impact on floral and faunal diversity. We predict that we will find both positive and negative impacts of elephants on their environment, with increasing negative impacts under high elephant densities in insular systems. We also predict that the variability of elephant impact is dependent on rainfall, primary productivity and the presence of artificial water sources. The outcomes of this study will improve our understanding of the role that elephants play in shaping ecosystems and allow for making informed decisions in implementing management interventions.

56 Calf growth and maternal energy investment in South African southern right whales

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Maternal body condition is a key determinant of reproductive success in southern right whales. We collected footage of mother and calf southern right whales in Walker Bay, South Africa, over three months of the calving season during 2022-2024 using a UAV to investigate maternal investment and calf growth rates through photogrammetric techniques. Our findings indicate that calves of the South African population show an average growth rate of 2,6 cm per day-1 (95% CI: 1,72-3,52). We estimated an average maternal body volume loss of ~18,7% (95% CI: 8,4-27,7) over the three-month period, reflective of the energy investment in the calf. This is lower than the ~25% volume loss reported for the Australian population, suggesting a lesser maternal investment in the calf, possibly due to a trade-off to ensure maternal survival. In turn, this may be related to the observed decadal decline in maternal body condition in the South African population that was related to decreased food availability in offshore foraging grounds. Our results show that population-specific assessments are critical to improve our understanding of the relationship between maternal body condition and reproductive success.

57 Cheetah populations in Zimbabwe declining rapidly

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Cheetah populations have undergone a 90% reduction since early 2000. The causes of the decline are thought to be a result of the government of Zimbabwe's Fast Track Land Reform Programme. We carried out a population survey, including a population viability assessment, to determine what might happen to the population in the future.

58 Aardwolf ecology in a mesic grassland ecosystem

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This study aims to explore the ecology of aardwolves (*Proteles cristatus*) within a mesic grassland ecosystem in South Africa, with a primary focus on Telperion Nature Reserve in Mpumalanga. The research seeks to describe the diet, foraging behaviour and social organisation of aardwolves, as well as to compare their behavioural relationships with other sympatric species. The final objective of this study will expand its geographic scope to include populations across South Africa, aiming to examine the genetic variation of aardwolves by utilising biobank samples across the provinces. By analysing haplotype differences, the study will infer the genetic history of aardwolf populations, providing insights into population connectivity, genetic differentiation and potential cryptic diversity. Through these objectives, this study will offer the first comprehensive, country-wide insight into the genetic structure and ecological relationships of aardwolves in South Africa. Understanding how aardwolves contribute to ecosystem stability and their interactions with other species, such as prey and other carnivores, is essential for determining their role in maintaining a balanced community.

59 The importance of private land for conservation: An update on the population status of southern giraffe in South Africa

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Giraffe (*Giraffa* spp.) occur across 21 African countries, but their populations have declined by ~30% over the past 35 years, from 150 000 to 117 000. This decline is driven by habitat loss, land degradation, climate change, poaching and civil unrest, leading to fragmented populations. Among the four giraffe species, the southern giraffe (*G. giraffa*) is the only one with a steady population increase. The largest known population occurs in South Africa across national parks, provincial reserves and private land conservation areas. Previous national assessments estimated 26 919-30 368 individuals in 2019, but were based on limited data, excluding areas previously deemed extralimital areas. Our study integrates literature reviews and landowner surveys, covering all nine provinces and 70 public and 915 private properties, estimating 25 954 (18 338-36 206) giraffe. Although Limpopo remains a stronghold, we find a broader distribution, especially in the Eastern Cape (16% of the total) and on private land, which contains 55,83% of the national

estimate. These findings provide a baseline for future conservation efforts and highlight the need to align management with changing habitats.

60 Mammal Red List of South Africa, Eswatini and Lesotho: Key results from the 2025 revision

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The IUCN Red List measures a species's extinction risk to inform conservation and policy. The IUCN recommends the re-assessment of species' statuses every 5-10 years, especially when new data emerges. The previous Mammal Red List was completed in 2016 and updated in 2025. Thirty-seven species had a status change, of which 17 were uplisted to a higher threatened category, meaning that mammals are faring worse overall than in 2016. Five were downlisted to a lower threatened category, but only three of these were genuine population increases. The rest were previously Not Evaluated or Data Deficient, but now have enough information for an evaluation. Climate change and population genetics were newly incorporated into assessments. Species Distribution Models for 14 species predict that the black-footed cat, riverine rabbit, Verreaux's mouse and vlei rat will be negatively affected by climate change. Assessment data was used to inform the genetic status of South Africa's mammals through the quantification of Kunming-Montreal genetic indicators – marking the first application across a complete taxonomic group and demonstrating a streamlined approach to inform species conservation status.

61 The movement ecology of African elephants (*Loxodonta africana*) in Kasungu National Park, Malawi

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Translocations are often used as a management tool to control population densities and growth. However, the success of translocations is seldom assessed, especially for long-living species such as African elephants (*Loxodonta africana*), where survival and reproduction are not suitable parameters to measure success. The movement ecology of African elephants is an effective method to measure both the effect and the success of a translocation on a population of elephants. In 2022, 263 elephants were translocated to Kasungu National Park, and 30 were collared with GPS collars. This threefold increase in elephant density allows us to evaluate how resident elephants respond to a large increase in elephant density, and how introduced elephants respond to a novel environment. African elephants are cathemeral animals, and thus move throughout their environment during both day and night. Therefore, this study also looks at the movement of elephants under different nocturnal environmental conditions, such as different moon phases. The outcomes of this study serve as a post-translocation evaluation and an aid in improving future conservation actions for elephants.

62 Assessing the performance of acoustic recording devices for recording rodent ultrasonic vocalisations

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Bioacoustics is an interdisciplinary field that uses sound technology to record animal communication data for analysis. Recently, the field of bioacoustics has gained considerable momentum as a powerful, non-invasive monitoring approach in zoology and ecology. Many rodents vocalise using ultrasonic vocalisations (USVs), primarily within the range of 20-100 kHz. Acoustic monitoring of bats is well researched, and the majority of ultrasonic recording devices and analysis software is configured for that purpose. Most studies on rodent USVs have been conducted using acoustic recording devices that are designed for detecting bat ultrasonic echolocations. Testing needs to be done first to identify if there are differences in the detection of USVs between acoustic devices and in different environmental settings. The test species is *Micaelamys namaquensis* (Namaqua rock mouse). The two acoustic recording devices that will be compared in this study were the Wildlife Acoustics Song Meter Mini Bat and the AudioMoth. Aim: To assess the efficacy of the two different recording devices (Song Meter Mini Bat and AudioMoth) for the detection of rodent ultrasonic vocalisations.

63 Microplastics and mercury: Highveld mole-rats (*Cryptomys hottentotus pretoriae*) as sentinels for environmental health monitoring

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Human activities have introduced microplastics (MP), plastic chemicals (phthalates) and mercury (Hg) into the environment. These contaminants have disrupted natural processes, driven significant biodiversity loss and caused lasting negative effects for animals, humans and ecosystems. This study aimed to assess MP, phthalate and Hg exposure in Highveld mole rats (*Cryptomys hottentotus pretoriae*, HMRs) across land use gradients in and around Rietvlei Nature Reserve, South Africa. We assessed and quantified MP, phthalate and Hg concentrations in soils from least disturbed, disturbed and most disturbed sites, and correlated these with concentrations in a variety of biological samples obtained from HMRs. We hypothesise that MP and Hg concentrations will be highest in soils and HMRs from disturbed sites, and that MP concentrations will be highest in faeces and intestines, phthalates in blood and liver, and Hg in hair and liver. Findings from this research will help to confirm that HMRs are a suitable sentinel species for monitoring soil and ecosystem health and will contribute new insights for non-invasive approaches for monitoring contaminants in wildlife.

64 An inventory of the bats of Telperion Nature Reserve: Taxonomic diversity and call library

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Species inventories are essential for informing conservation measures and effectively managing protected areas (PAs). However, such inventories are often incomplete for bats (order Chiroptera) within South African grassland biome PAs, such as Telperion Nature Reserve (TNR). To address this data gap, we sampled bats from 2019 to 2021, covering multiple seasons and four different habitats. We conducted passive acoustic sampling using ultrasonic detectors, combined with catch-mark-release methods, to survey the bat fauna of TNR. We used handheld ultrasonic detectors to record the echolocation calls of released individuals. As a result of these efforts, we documented 22 species from seven families. Acoustic sampling enabled us to identify 21 of these species. We compiled the echolocation calls of 167 released animals from 11 species into a regional call library, which enabled us to confirm intersex and geographic variation in certain taxa. We provide a pictorial guide, including echolocation call spectrograms and parameters for the various species. We hope that the call library will serve as a valuable resource for advancing studies on bats in South African Highveld grasslands.

65 Where's the beef? Stable isotopic analysis of dietary responses to land use and season in southern African rodents

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Wildlife dietary studies using minimally invasive techniques can elucidate the impacts of anthropogenic activities on ecosystems and native species. These techniques cause minimal pain and stress to animals, allowing them to be released after sampling. Long-term stable isotope dietary studies can be used to measure ecosystem health. We compared carbon (δ13C) and nitrogen (δ15N) isotope ratios obtained from keratin tissues (hair and nails) of eight native rodent species from the Magaliesberg in the North West province. Correlation tests showed that variations between hair and nail δ13C and δ15N ratios are negligible within six of the eight species. Following this, δ13C and δ15N ratios of four dominant rodent species were compared across land use types (transformed and untransformed) and seasons (dry and wet) over three years: *Aethomys ineptus*, *Lemniscomys rosalia*, *Mastomys coucha* and *Micaelamys namaquensis*. For *A. ineptus* and *M. coucha*, isotopic variation correlated significantly with land use, while *M. namaquensis* was affected by both. Generalist species can persist in altered landscapes and amid increased human encroachment, while specialists struggle to adapt and may face local extinction.

66 Tracking succession and disturbance through small mammal communities in the Kalahari

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Small mammals are a key component of environmental assessments and biodiversity monitoring in southern Africa, offering several advantages as bioindicators. Their community structure reflects various ecological attributes, including habitat complexity, primary productivity, and disturbances such as overgrazing, trampling, and the presence of invasive species. Ecological theory suggests that changes in small mammal diversity and species composition can mirror successional processes: diversity and species richness are expected to increase with succession, generalist species tend to dominate in early and degraded stages, while specialists become more prevalent near ecological climax. Certain species may also appear or disappear at different successional stages. This study presents insights from the first five years of a long-term small mammal monitoring project at Tswalu Kalahari Reserve. We outline the aims, sampling protocols, and preliminary findings, and explore the relationships between small mammal community metrics and vegetation parameters as indicators of habitat change.

67 Spatiotemporal ecology of the yellow mongoose (*Cynictis penicillata*) in the Rand Highveld Grassland

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Mesic grassland biomes, such as the Rand Highveld Grassland, have undergone extensive habitat degradation due to intensifying human activities. Given their sensitivity to environmental changes, small mammals serve as indicators of ecosystem health. This study focuses on the spatiotemporal ecology of the yellow mongoose within the relatively undisturbed Telperion Nature Reserve. Over a year, we will monitor individuals using VHF collars and GPS, tracking their movements every five minutes. We will also employ camera traps and direct observations to record behavioural time budgets, while collecting weather and other abiotic data for seasonal analysis. We will map activity hotspots using ArcGIS Pro and use Generalised Linear Models (GLMs) in R to analyse movement patterns. We anticipate reduced daytime activity during hot summers, and increased crepuscular activity along with opposite trends in winter. Males are expected to have larger ranges. This study aims to establish a baseline for this species in a threatened habitat and will assist in identifying areas to prioritise during conservation planning.

68 Paws for thought: Using Footprint Identification Technology (FIT) to assess ecological integrity through the lens of small mammals

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Humanity faces an environmental crisis driven by biodiversity loss, climate change and habitat fragmentation. To address these challenges, we need fast, reliable data to pinpoint where and how these impacts occur. Traditional approaches to monitoring ecological change remain time-consuming and costly. This poster showcases a groundbreaking international initiative based in South Africa using technology developed by WildTrack, which uses small mammal footprints as a transformative, non-invasive tool to measure and mitigate environmental impacts. Fluctuations in species composition and density of small mammal species are valuable indicators of ecosystem health, since small mammals respond rapidly to environmental changes, serving as the "canaries in the coal mine" for ecological integrity. Our approach combines traditional ecological knowledge with cutting-edge analytics to identify species through their footprints, offering a non-invasive, cost-effective solution. This method avoids trapping animals, relying instead on AI and morphometrics. Communities are expected to play a vital role, leveraging local tracking expertise and fostering engagement in conservation efforts.

69 Informing our stewardship of African baobabs (*Adansonia digitata* L.): Population distribution and sustainable use

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African baobabs play a crucial role in the lives of millions of people in arid regions of Africa. They provide food and shade and serve as a source of income. While baobabs face increasing threats from natural and human factors, monitoring these trees in vast, remote landscapes is challenging with traditional field-based methods. The objectives of this research are: i) to review the current state of knowledge and identify gaps in the sustainable use of baobabs in Africa, ii) to create an open-access, community-contributed dataset on the distribution and condition of African baobabs, iii) to test remote sensing data and U-Net modelling approaches to map baobabs, and iv) to evaluate the spatial and temporal patterns of baobab mortality caused by elephants across landscapes experiencing fluctuating elephant pressure. To achieve these objectives, the study integrates a desktop study, key informant interviews, crowdsourcing experiments and satellite data with machine learning models (U-Net). The method will be tested in two distinct biophysical environments in northern South Africa. This research will improve the monitoring of baobab populations and inform their sustainable use.

70 An ethnobotanical assessment and conservation status of medicinal plants in semi-arid Shangani Holistic Ranch and adjacent communities in Zimbabwe

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This study examined the erosion of indigenous knowledge and threats to medicinal plants in Shangani Holistic Ranch and nearby communities. It documented 73 medicinal plant species (primarily trees from the Fabaceae family), with bark being the most harvested part, posing conservation risks due to destructive harvesting. Key species like *Cassia abbreviata*, *Pterocarpus angolensis* and *Xanthoxylum capense* held high cultural significance, especially for treating anemia and respiratory and gastrointestinal diseases, demonstrating reliable traditional knowledge. Vegetation assessments showed moderate diversity, with overlap between reported and observed species. The Conservation Priority Index highlighted high-risk species like *Cassia abbreviata* and *Colophospermum mopane*, threatened not only by medicinal use but also by multi-use pressures (fodder, firewood, construction) and land use changes (farming, settlements). The study underscores the need for sustainable management, recommending stronger local bylaws, regulated land use and the integration of ethnomedicine into broader conservation strategies to preserve both biodiversity and cultural heritage.

71 Improving the nutritional composition of bread through supplementation with edible insects

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Malnutrition is a worldwide health problem that is prevalent in developing countries due to a lack of essential nutrients such as protein, zinc and iron. This study aims to improve the nutritional content of white and brown bread using edible insects. Edible insects were milled into insect meal, and experimental bread was prepared where wheat flour was partially substituted with different proportions of termite and mopane worm meal: 0%, 5% and 10% in separate mixtures. There was a significant difference ($p < 0,05$) in the proximate and mineral composition of white and brown bread supplemented with mopane worm and termite meal. The proximate and mineral element content of white and brown bread significantly increased with increasing concentrations of edible insects. A significant increase in protein content was observed in white bread containing 5% and 10% mopane worm and termite meal. Similarly, a substantial increase in mineral content was observed in both white and brown bread. These findings indicate that supplementing bread with mopane worm and termite meal improves the nutritional composition of bread and that both insect types are suitable for incorporation in the two bread types.

72 Nutritional advancement and colour changes of South African staple food (thin and crumbly maize porridge) when supplemented with edible insects

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Protein-energy malnutrition (PEM) and mineral deficiencies, particularly iron and zinc, are prevalent in developing countries. To address these issues, the FAO recommended the consumption of edible insects because they contain high-quality protein and other nutrients, including zinc and iron and some essential amino acids. This study investigated the effect of partially replacing maize meal with mopane worm, termite, and Gynanisa caterpillar meals on the colour and nutritional value of thin and crumbly porridges. The thin and crumbly porridge samples were prepared using standard methods, but maize meal was partially substituted with 5% and 10% (w/w) edible insect meals. The colour and nutritional composition of the porridge samples, as well as the control (100% maize meal), were analysed using standard methods. Thin and crumbly porridge samples darkened with higher concentrations of edible insect meal, especially with termite meal, compared to other insect types. In addition, the nutrients (mainly in terms of protein, essential amino acids and minerals (iron and zinc)) of thin and crumbly porridge increased with increasing concentration of the edible insect meals.

73 Advancing waste-to-energy solutions for sustainable rural development: A case for biogas technology in enhancing climate resilience and livelihoods

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The transition to sustainable energy solutions is critical for addressing both environmental and socio-economic challenges in rural communities. Waste-to-energy (WTE) technologies, particularly biogas technology, present an opportunity to convert organic waste into renewable energy while promoting sustainable rural development. This study explores the role of biogas technology in enhancing climate resilience and livelihoods in rural South Africa, focusing on its contributions to energy access, waste management and economic empowerment. Through a systems thinking framework, the research examines the interconnected factors influencing the adoption and long-term sustainability of biogas technology. Findings highlight how household- and community-level biogas adoption reduces reliance on traditional biomass, mitigates deforestation and decreases greenhouse gas emissions. Additionally, the study reveals the economic benefits of biogas, including job creation, cost savings on energy, and opportunities for youth capacity building in the WTE sector.

74 The role of edible insects in rural livelihoods, and identified challenges in Vhembe District, Limpopo, South Africa

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Edible insects are an important natural commodity in rural areas and are used for household consumption and to generate income through trade. This study aimed to determine the socio-economic benefits of and reasons for trading insects in the Vhembe district of Limpopo Province, South Africa. We administered 72 questionnaires targeting traders in five towns across the district. Five insect groups belonging to four insect orders are traded in the informal markets of the district. Mopane worms were the most traded (42%) edible insects. Unemployment (45%) and the demand for edible insects (34%) were the major reasons for trading insects. Insect trading has numerous benefits; however, the provision of income (60%) and financial support (35%) were stated as the primary benefits. Trading in insects is a traditional practice based on indigenous knowledge, and has persisted as an economic practice that improves rural livelihoods by reducing poverty and increasing the human dignity of rural citizens. The government could offer support to edible insect traders by providing infrastructure and access to harvest areas as part of a rural empowerment strategy to end hunger and poverty.

75 Pollen atlas of subtropical southern Africa (Pollen and Spores of KwaZulu-Natal)

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The correct identification of pollen and spores allows for palaeovegetation reconstruction and inferences of past climates. Identification of fossil pollen and spores is usually done by comparing the recovered pollen with reference materials, which can be difficult to access, as the reference materials are spread across different university palynology laboratories; and due to the level of preparation and issue of preservation, these materials are susceptible to decay. Hence the need to document these reference materials in southern Africa to have a central repository that is easily accessed. Photographs and videos of the reference materials from the University of KwaZulu-Natal have been captured using a Leica microscope camera at 1 000 magnification, and over 200 different species consisting of gymnosperms, angiosperms and pteridophytes have been captured and converted to digital images, accessed through the internet, aiding in delimiting species during pollen identification and in turn contributing to the understanding of the Quaternary palaeoenvironment of southern Africa.

76 Interacting Effects of Different Fire Regimes, Simulated Ungulate Browsing, and Reseeding for restoring *Seriphium plumosum* encroached areas in the Telperion Nature Reserve, South Africa

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Woody plant encroachment is a key driver of rangeland degradation in southern Africa, with *Seriphium plumosum* (bankrupt bush) emerging as a dominant encroacher. This unpalatable shrub suppresses herbaceous biomass and reduces productivity, yet remains understudied. Traditional control methods such as herbicides, mechanical removal and fire are often costly or yield only short-term results. This study evaluates the effects of head- and backfires (0,5 ha each) on *S. plumosum* density and grass recovery using a paired design with 12 fenced exclosures per fire regime. Headfires, with higher intensity and faster spread, are expected to damage above- and below-ground biomass more than backfires. Post-fire treatments such as simulated browsing, grass reseeding and arboricide are applied inside and outside the exclosures to assess individual and interactive effects on vegetation recovery. We hypothesise that headfires will suppress *S. plumosum* regrowth more effectively, and that shrub coppicing will be greater in grazed areas than in grazing exclosures, influencing treatment outcomes. Findings will support cost-effective, sustainable strategies for managing *S. plumosum* encroachment.

77 Responses of tree phenology to temperature and rainfal cues in a semi-arid savanna, Laikipia, Kenya

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Plant phenology, the study of the timing of seasonal biological events, is increasingly shaped by changing rainfall patterns and temperature regimes through advancing or delaying phenological events. This study is exploring the influence of environmental drivers on the phenological cycles of dominant tree species set across two soil types (black cotton and red alluvial soils) and herbivory regimes (enclosed vs open plots) in a semi-arid savanna. Using long-term observational datasets (2021-2025) on phenological cycles across 10 species that were examined on a biweekly basis every month, we are evaluating relationships between phenological cycles and climatic cues (rainfall and temperature). Rainfall seems to be a stronger predictor than temperature, as shown by our preliminary results, as leafing and flowering tend to respond more to rainfall, with earlier leafing in red soils compared with black cotton soils. Additionally, herbivory tends to delay certain phenological cycles, and more so during the dry seasons. The findings will contribute to an in-depth understanding of the potential shifts in phenological patterns and their implications for ecosystem stability.

78 *Rhigozum trichotomum* removal effects at Tswalu on Kalahari duneveld herbaceous layer: Comparing 50% and 100% intensities

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This study examines bush encroachment by *Rhigozum trichotomum* in South Africa's Tswalu Kalahari Reserve, which degrades the savanna's structure, biodiversity and rangeland function. We assess the effectiveness of different control intensities (50% and 100% removal) applied to 10 m x 10 m treatment plots for enhancing herbaceous biomass production and altering soil properties. Soil samples (analysed for physical and chemical properties) were taken before treatment and will be compared after the project. Preliminary results from the first wet and dry seasons after treatment (Wet 1: April-May 2024 and Dry 1: September-October 2024) indicate initial responses in herbaceous cover, composition and biomass within the monitored inner 6 m x 6 m plots. Groundcover, herbaceous composition, abundance and standing biomass were measured at 42 fixed points per plot using standardised protocols. Findings will inform sustainable rangeland management strategies for *R. trichotomum* control in Kalahari duneveld ecosystems.

79 Evaluating bush control methods on vegetation

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Bush encroachment by *Senegalia mellifera* poses a significant threat to rangeland health in semi-arid southern Africa, reducing herbaceous cover, biodiversity and grazing potential. This study evaluates manual, chemical and integrated bush control methods at Tswalu Kalahari Game Reserve (TKGR), with the aim of identifying treatments that most effectively promote herbaceous biomass recovery and species diversity, while ensuring ecological stability and cost-effectiveness. Although a range of control methods are available, empirical data on their comparative effectiveness remains limited, constraining informed land management. Preliminary findings suggest that moderate thinning (50%) combined with stump-applied arboricide yields the highest herbaceous recovery. Integrated approaches appear to offer the best balance between ecological outcomes and operational feasibility. By incorporating an economic perspective, this study contributes practical insights to support sustainable and financially viable bush management strategies for land users, conservationists and policymakers across the region.

80 Response of African savanna trees to extreme heat

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The response of trees to temperature change has been studied in temperate, boreal and tropical systems, but little is understood about how savanna trees may respond to warming. Due to the history of seasonal climatic variation in savannas, trees may be less vulnerable to warming because of increased capacity for thermal acclimation to temperature optima. However, these trees may already be living close to their

temperature optima, with increases beyond that driving declines in photosynthesis and increases in leaf respiration. This talk synthesises new findings from three papers exploring how the survival, growth and physiological functioning of dominant savanna tree species in southern Africa respond to extreme heat. These are the first studies examining how savanna trees may alter in response to the extreme heat events predicted to become more frequent and intense in southern Africa as the climate continues to change.

81 Evaluating the influence of *Seriphium plumosum* and grazing lawns on termite diversity and foraging

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This study investigates how *Seriphium plumosum* encroachment and grazing lawns impact termite diversity and foraging activity compared with natural grasslands. Termites are important soil ecosystem engineers, contributing significantly to soil structure and nutrient cycling, but their ecological roles can be changed by land use practices and vegetation shifts. *S. plumosum,* a woody shrub, modifies habitat structure and organic matter input, while grazing lawns, shaped by intense herbivory, present unique grass compositions and elevated litter availability. The study uses standardised baiting techniques of unscented toilet rolls and containers of dried grass biomass, placed in replicated grids across the three habitat types, alongside termite collection surveys. This study assesses termite presence and foraging activity. Preliminary findings show that grazing lawns support both Macrotermes natalensis and Amitermes hastatus, with significantly higher foraging activity, whereas natural grasslands and *S. plumosum*-encroached areas are inhabited only by *A. hastatus*, with the lowest foraging activity. The findings aim to enhance understanding of ecological relationships in grassland ecosystems.

82 The mosses and liverworts of Tsaratanana, the highest mountain of Madagascar

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The Tsaratanana Massif is the highest mountain range in Madagascar. The diversity and distribution patterns of mosses and liverworts on the massif are poorly understood. We are investigating species richness and community composition across different microhabitats (ground, tree trunks and leaves) along an elevation gradient. Mosses and liverworts were collected along an altitudinal gradient from 1 500 to 2 700 m. Two plots of 10 m x 10 m were established at 200 m intervals. Within each plot, three 2 m x 2 m quadrats were randomly selected to collect samples from different microhabitats. Preliminary results show notable bryophyte species richness. For instance, at lower elevations (1 500-1 700 m), 142 species from 63 genera and 32 families were identified, with 4,58% endemism. Liverwort is more diverse, comprising 82 species, while mosses comprise 60 species. Within that elevational range, tree trunks showed the highest species richness. Most species from the ground community are rare, whereas common species mainly colonised tree trunks. The remaining elevational zones undoubtedly host more species, significantly increasing the mountain's documented bryophyte diversity.

83 Investigating the impact of *Seriphium plumosum* encroachment on soil water dynamics in grassland ecosystems

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Woody plant encroachment threatens the health and hydrology of grassland ecosystems worldwide. The shrub *Seriphium plumosum* has become an aggressive indigenous encroacher in South African grasslands. Even though *S. plumosum* has increasingly altered grassland systems, few studies have investigated its impact on soil water dynamics. This study investigates the impact of *S. plumosum* encroachment on water infiltration, rainfall interception, run-off and soil moisture retention at Telperion Nature Reserve, Mpumalanga. The study employs the use of custom-built rainfall simulators, mini-disk infiltrometers and rain gauges, and controlled field experiments are conducted across paired encroached and unencroached grassland areas. Vegetation composition and soil physical properties such as texture and bulk density were also assessed. Preliminary results suggest that *S. plumosum* alters hydrological processes by increasing rainfall interception, with potential implications for run-off and soil water infiltration. The changes may decrease water for herbaceous plants, impacting ecosystem health, so understanding these shifts is key for grassland conservation and management.

84 Using charcoal and pollen to assess fire history and vegetation flammability in African savanna at long timescales

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Climate change and human land use pose a threat to savanna open ecosystems, which make up about 25% of the earth's terrestrial biomes and sustain biodiversity and human livelihoods. In addition to contributing to atmospheric CO_2 and ecological degradation, fire is an essential ecosystem process for preserving vegetation openness. Charcoal particles from fires can help us understand fire histories at different temporal and spatial scales, because they provide information on past fire frequency, burned areas and fire severity. However, the idea of fire as an evolutionary process whereby positive feedback from fire maintains persistent open ecosystem states has received little attention in savanna palaeoecology. Additionally, differences in charcoal quantification make it difficult to analyse fire history at regional and global scales. Here, we compare various charcoal quantification techniques and evaluate flammability – that is, the vegetation's capacity to start and maintain fire – using charcoal and pollen from a 60 000-year savanna record from Wonderkrater, South Africa. A new, independent charcoal record is being developed to assess fire as a driver of openness.

85 Sustainable Management of South African Mesic Grasslands: Lessons from Forbs

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Mesic grasslands of southern Africa (>650 mm MAP) are dominated by grass biomass but rich in forb diversity, supporting pollinators, wildlife, and seasonal forage while providing cultural and medicinal resources. However, ploughing and chronic overgrazing deplete forbs, reducing ecosystem services and resilience. A decade of research reveals that persistent overgrazing, especially by dense herds, drastically reduces forb populations. Repeated trampling and defoliation weaken vigour and deplete underground storage organs (USOs), compromising survival and regrowth. Forb-rich grasslands indicate stability and good management, while forb-depauperate systems suggest chronic overgrazing and slow recovery. Some forbs serve as key grazing indicators. Though USOs have enabled forbs to endure fire and drought for millions of years, they do not protect against frequent, severe defoliation. Under such pressure, decline is rapid and often irreversible. Protecting mesic grasslands requires lenient grazing, fire management, and regular monitoring of key forb species to detect early degradation.

86 Exploring the potential of aromatic perennials for remediation of mine-tailings in South Africa

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Sustainable rehabilitation and remediation of mine tailings are one of the most difficult and costly challenges facing the mining industry today. Phytoremediation offer an environmentally sustainable approach to reclaim heavy metal polluted soil. Successful implementation of phytoremediation strategies could lead to the remediation and recovery of metal contaminants while simultaneously promoting biodiversity conservation. Research on the Ni-hyperaccumulator, *Berkheya zeyheri*, suggest that Ni hyperaccumulation is linked to the interaction of organic- and amino- acids that allow metal accumulation to occur. These molecular relationships in hyperaccumulators provided insights into soil amendments to enhance the phytoremediation capacity of (non)-accumulators. This study investigates the effect of supplementing *Helianthus annuus* (Sunflowers) and *Tagetes erecta* (Marigolds) with organic acids (malic acid, citric acid) for enhanced metal uptake. These plants are readily available and offer additional economic benefits (sunflower oil and essential oils), making them attractive for large-scale phytoremediation strategies.

87 Nutritional and Functional Characterisation of *Corchorus olitorius* Fruits: An Indigenous Resource for Food Security in Limpopo, South Africa

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Food insecurity can be addressed by diversifying diets with underutilised indigenous crops that are nutritious and climate resilient. This study examined the nutritional composition, mineral profile, and functional properties of *Corchorus olitorius* L. fruits collected from two South African villages, Masia and Valdezia. Fresh fruits were freeze-dried (-80°C) and grounded. Proximate composition followed modified AOAC methods, minerals were quantified by ICP-OES, and functional properties assessed using standardized protocols. Moisture (~83%) and ash (~10%) were high in both sites, while Valdezia fruits had greater soluble protein (2.50 g/100 g) and fat (3.06 g/100 g). Mineral profiling revealed high calcium (Masia: 9315; Valdezia: 12,204 mg/kg, p = 0.002), magnesium, potassium (Masia: 5263; Valdezia: 6935 mg/kg, p = 0.001), and sodium. Nutritional ratios were favourable: Na:K <0.26, Ca:K ~1.76; though Ca:Mg was above the recommended range. Nutritional ratios were within recommended ranges: Na:K < 0.26, Ca:K ~1.76. The Ca:Mg was higher than recommended ranges for both populations. Functional properties showed moderate water absorption (13.9 g/g), oil absorption (2.5 g/g), and stable solubility (up to 3.3%) and swelling (5.4 g/g at 80 °C).Lastly, the swelling power reached 5.41 (g/g) in Valdezia at 80°C. The findings suggest *C. olitorius* fruits are nutritionally and functionally applicable. The fruits may help address micronutrient deficiencies and enhance the value of indigenous biodiversity.

88 A critical review of the methods for estimating the carbon sequestration potential of tropical savanna ecosystems under different conservation approaches using insights from southern Africa

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Tropical savanna ecosystems, characterised by their unique interplay of grasslands and scattered trees, are pivotal in global carbon cycling due to their extensive coverage and significant biomass. However, estimating their carbon sequestration potential remains a complex challenge, particularly under the varying conservation approaches used in both protected areas and communal lands. This research aims to critically review the methodologies employed to quantify carbon sequestration in tropical savannas, with a specific focus on insights derived from southern Africa. The review will begin by examining traditional methods such as field-based biomass assessments and soil carbon sampling, highlighting their strengths in providing localised accuracy and scrutinising methodological limitations like labour intensity and spatial constraints. It will then transition to advanced remote sensing technologies that leverage satellite imagery and LiDAR data to estimate aboveground biomass over larger scales. Special attention will be given to methodologies that explore the different conservation approaches aimed at both biodiversity preservation and carbon sequestration goals.

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