



AFROMONTANE RESEARCH UNIT

University of the Free State

A decade of research, discovery, and impact



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*Inspiring excellence,
transforming lives
through quality,
impact, and care.*

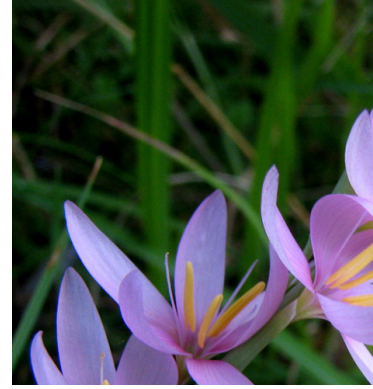


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PREFACE



This short magazine is a snapshot of some of the ARU's growth and higher profile activities over the past decade. Each success is because of many, and we acknowledge and thank those who paved the way before 2015, and who have worked so hard to achieve the results evident since the ARU's official founding in 2015. The content has been kindly supplied by ARU champions and their teams, as well as using the ARU's annual reports (2018-2023) and Self-Evaluation Report (2024). The combined content was then reworked by the editors for easy readability and a common 'flow' throughout the magazine. Not all projects are included, as such a work would easily become a book – we have tried to emphasise the main achievements of the past decade. We have taken every effort to honour the more than 100 postgraduate students in the Acknowledgements, as well as all partner/collaborative organisations and funders.



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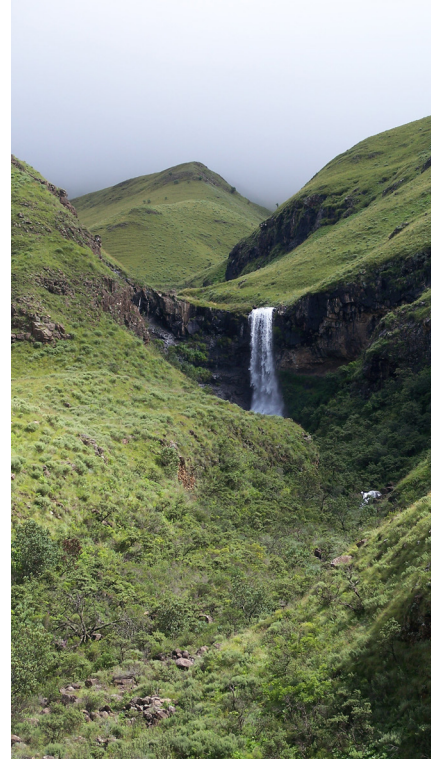
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VOICES OF STEWARDSHIP GUIDING THE ARU JOURNEY

Photo: Sven Musica – Love Africa Marketing



Message:

Prof Hester C. Klopper,
Vice-Chancellor and Principal

As the Afromontane Research Unit (ARU) celebrates its first decade of excellence, we acknowledge with great pride how this flagship research entity embodies the University of the Free State's commitment to creating **responsible societal futures** – our guiding North Star.

The ARU stands as a testament to what becomes possible when vision meets purpose. This unit has transformed our Qwaqwa Campus into a beacon of African mountain research, asserting the intellectual leadership that our continent rightfully deserves. By positioning Southern African montane systems within continental and global arenas, the ARU challenges the historical dominance of Northern Hemisphere perspectives, bringing African voices to the forefront of mountain research theory, practice, and governance.

Your work exemplifies our institutional identity as an entrepreneurial knowledge ecosystem and innovative university. This collaborative research transcends disciplinary, institutional, and geographical boundaries, and researchers foster the 'community of practice' that is essential for the sustainable development of the Maloti-Drakensberg and beyond.

As you embark on the next decade, I encourage you to continue to lead with impact and heart.

I truly believe that the mountain communities in the Southern Hemisphere have found their voice through you.

Message:

Prof Prince Ngobeni, Campus Principal: Qwaqwa Campus

I extend my warmest congratulations to the Afromontane Research Unit (ARU) on reaching this remarkable ten-year milestone. Since its inception in 2015, the ARU has been a beacon of excellence, driven by a clear mission to advance African mountain research and transboundary conservation. This vision not only aligns perfectly with the UFS Vision 130 but also serves as a testament to the power of focused academic endeavour.

Over the past decade, the ARU's journey has been one of significant growth and profound impact. It has been instrumental in strengthening the academic profile of the Qwaqwa Campus, providing invaluable opportunities for our staff and students to engage in world-class research. The unit's dedicated work has resonated far beyond our borders, solidifying its presence on the national and global stage and showcasing the vital role of African scholarship in addressing global challenges.

Looking ahead, the ARU's future is incredibly promising. With its current team, strategic research focus, and pending projects, the unit is perfectly poised to continue its trajectory of innovation and influence. I am confident that the ARU will further its mission, contributing to the development of our region and inspiring a new generation of leaders and researchers to continue this vital work.





Message:

Prof Vasu Reddy,
Deputy Vice-Chancellor: Research,
Innovation and Postgraduate Studies

As the Afromontane Research Unit (ARU) marks a decade of scholarly excellence, it is with great pleasure that I extend my deepest congratulations to its leadership, researchers, students, and partners. The ARU is a visionary platform – a catalyst for research-driven, socially responsible futures.

Founded in 2015, the ARU has grown from a bold idea into a continental leader in African mountain research. Its journey and evolution reflect a rare synthesis of intellectual ambition, policy relevance, and community engagement. From the alpine summits of the Maloti-Drakensberg to the transboundary landscapes of the Manica Highlands and Madagascar, the ARU has demonstrated that place-based research can have local impact and global resonance.

It is clear that the ARU's work is deeply embedded in the social-ecological systems of Southern Africa. Its transdisciplinary focus – spanning biodiversity, climate resilience, governance, and livelihoods – has catalysed new knowledge systems and policy dialogues. The successful hosting of SAMC2022 and SAMC2025 under UNESCO patronage is testament to its convening power and continental influence.

The ARU's alignment with Vision 130 is not incidental; it is intentional. The ARU has positioned the Qwaqwa Campus in many ways as a hub of transdisciplinary innovation, attracting international partnerships and major research grants, while nurturing a new generation of African scholars.

As Chair of the ARU Advisory Board, I have witnessed the unit's evolution with admiration. Its governance model – rooted in collaboration with traditional leadership, international experts, and local communities – embodies the principles of co-creation, stewardship, and transformative impact.

As the ARU enters its next phase, it must amplify its impact by translating knowledge into action, shaping policy, and forging strong regional alliances. The proposed SADC Mountain Treaty, the Mont-aux-Sources LTSER platform, and the GMBA Southern Africa Hub are strategic instruments for shaping mountain futures that are just, resilient, and inclusive.

In my humble estimation, the ARU's story is one of vision turned into action, of local rootedness with global reach, and of science in service of society. It is a story that inspires us to imagine new possibilities for African scholarship – possibilities that are bold, grounded, and transformative.

Let us continue to climb together.

Message:

Dr Molapo Qhobela,
Deputy Vice-Chancellor:
Strategic Initiatives,
International and Institutional
Affairs

The Afromontane Research Unit (ARU) stands as a powerful example of how locally rooted and internationally benchmarked scholarship can shape global conversations. It is a strategic initiative of the University of the Free State, taking advantage of our unique location in the **Maloti-Drakensberg** to respond to the needs of societal futures through research and scholarship.

As the university deepens its commitment to transformation and societal relevance, the ARU's work in mountain research, capacity development, and transdisciplinary collaboration aligns seamlessly with our strategic priority of advancing academic excellence and a reputation for societal impact.

With deep experience in African and international higher education and research systems, I recognise the importance of expanding the ARU's reach – strengthening its partnerships, increasing its visibility, and ensuring that its contributions resonate across science policy platforms. The ARU's success in securing external grants and building early-career capacity reflects the kind of excellence that positions it as a continental leader.

As we look ahead, I see the ARU not only as a flagship research group, but also as a catalyst for Africa's growing influence in global science. I am proud to walk alongside this team as we shape a more inclusive, responsive, and impactful research future.





Message:

Prof Corli Witthuhn, Vice-Rector: Research at the ARU's inception (2015)

In 2014, while serving as Vice-Rector: Research, I was tasked with developing a strategy to enhance research activities on the Qwaqwa Campus. Guided by input from both internal and external stakeholders, including leadership from the National Research Foundation (NRF), we decided to centre our strategy around the campus' unique geographical location. With the majestic Drakensberg Mountains on its doorstep, the Qwaqwa Campus offered an ideal setting for the mountains to serve as a 'living laboratory'. This vision led to the establishment of the Afromontane Research Unit (ARU), with Prof Ralph Clark appointed as Director. The goal was to strengthen multidisciplinary mountain research across all faculties on the campus. Thanks to generous funding from both the NRF and the University of the Free State (UFS), we were able to construct a dedicated building for the ARU. Since its launch, the unit has flourished and today it is home to a dynamic research community that includes postgraduate students, postdoctoral fellows, and researchers from various departments, disciplines, and countries. It has been deeply rewarding to witness the ARU grow into a flagship research entity at our university – one that continues to inspire both academic excellence and collaborative innovation across disciplines.

Message

Prof Ralph Clark,
Director of the Afromontane
Research Unit (ARU)

Truly significant things can be achieved with a good team and an array of goodwill partnerships. As the first Director of a pioneer experiment at the UFS, I am extremely grateful for the excellent team that the ARU has become, and for the very diverse array of goodwill partnerships that have grown across a variety of sectors – academic, business, policy, and practitioner – in the common pursuit of a robust community of practice for Southern African mountains. The mandate given to the ARU was not easy – pioneering is never comfortable terrain – yet the ARU team has risen to the occasion and pursued a level of excellence and embraced calculated risk that has catapulted the ARU to global recognition and influence in a relatively short time. I am especially proud of how members of the team have embraced the transition from internal funding dependence to a high, almost exclusive external funding success rate – accompanied by a pleasing increase in both quality and quantity of research outputs. I am also grateful for how individuals have owned certain aspects of our growth – and are successfully navigating the complex relationship management that comes with this. This success is evident in the number of UFS staff achieving doctorates through ARU support, ARU team members receiving departmental and faculty promotions, a wonderful run of new professorships, and an array of excellence awards. The many successes of our students and postdoctoral fellows further emphasise this growth in excellence – with many of our students being offered attractive employment and further study opportunities. Our affiliated fellows, in addition, are providing much-valued additional capacity in the ARU, and their achievements on the global stage complement our local impact. These successes suggest that the ARU's embracing of a co-operative and enabling philosophy has provided an environment for personal and professional growth across disciplines and career stages. On behalf of the ARU team, I wish to express our deepest gratitude to the UFS Top Management – including the Qwaqwa Campus Principalship – for their support of the ARU, and continued wisdom and advice on our trajectory, and for the positive relationships with many UFS organs that have been developed over the past ten years.





FROM STRATEGY TO SUMMIT: DEFINING MOMENTS OF THE ARU



Tracing the ARU's journey

The ARU was formally established as the flagship research initiative of the Qwaqwa Campus in 2015. It began as an internal grant programme to boost research capacity and productivity on campus. Since then, it has grown into one of Africa's leading mountain research groups. The ARU's intellectual identity is rooted in Southern African mountains as social-ecological systems, with the ARU being a catalyst for a regional mountain community of practice that bridges the science, policy, and practitioner sectors.

Phase 1 (2015–2017) focused on establishing foundations: acquiring a building, forming an advisory board, and expanding a research grantee base. Research during this period was structured into three broad themes, managed by three coordinators: Conservation and sustainable use of Afromontane biodiversity; Living and doing business in Afromontane environments; and Sustainable futures for the people of the Afromontane.

Phase 2 (2018–2022) marked a period of unprecedented growth, based on a first formal five-year strategic plan. Core achievements were the appointment of a director, intensive capacity building, creating an intellectual identity beyond a grant programme including research champions, a dramatic shift from internal dependence to external competitive grants, connecting with the global mountain research community, and increasing research output quantity and quality.

Phase 3 (2023–2027) is a process of consolidating wins, self-reflection, and trouble-shooting challenges before a next phase of strategic growth. This includes a review

process (2023–2025), consolidating key partnerships, and strategic planning for alignment with Vision 130. This phase included the spin-off of the DSI-NRF-funded Centre for Global Change as a sister unit on the Qwaqwa Campus.

By 2025, the ARU had supported more than 100 postgraduate students and 25 postdoctoral fellows, was producing on average 40 research outputs annually – many in high-profile international journals – and had secured external research grants valued at approximately R100 million. The dedicated facility now anchors a vibrant community of UFS scholars and an impressive array of diverse partners.

Today, the ARU's geographic reach spans 13 African countries, with growing global influence. It continues to counterbalance the dominance of the Global North in mountain narratives, offering a grounded, inclusive, and innovative African voice. The next chapter will focus on deepening impact through knowledge translation, policy integration, and sustained regional partnerships.



Advancing UFS Vision 130 through mountain research excellence

Prof Ralph Clark, Director of the Afromontane Research Unit (ARU), in front of the ARU Building on the Qwaqwa Campus – where mountain research excellence aligns with UFS Vision 130 to drive impact and innovation.

Photo: Sonia Small

The Afromontane Research Unit (ARU) continues to exemplify the University of the Free State's (UFS) Vision 130 through its distinctive contributions to research, transformation, and societal impact.

As a flagship entity on the Qwaqwa Campus, the ARU embodies the multi-campus model by driving regionally relevant, globally competitive research while advancing inclusive academic excellence. Its postgraduate cohort reflects transformative demographics, and its graduates are increasingly visible

in employment sectors linked to sustainability, conservation, and policy.

The ARU's alignment with UFS Vision 130 is evident in its commitment to engaged scholarship, financial sustainability, and intellectual leadership. It has positioned the Qwaqwa Campus as a hub for transdisciplinary research, attracting international partnerships and funding – including major international research grants. The ARU's work in capacity building, community-based research, and

policy engagement directly supports the UFS' strategic goals of knowledge generation and societal relevance.

By cultivating a continental footprint in African mountain research and contributing to global scientific networks, the ARU strengthens the UFS brand as a university that leads with purpose. Its success in bridging science, society, and governance reflects the transformative ambition at the heart of Vision 130, making the UFS a catalyst for change in both local and global contexts.

Connecting people, knowledge, and mountains for a sustainable future

The Southern African Mountain Conference (SAMC) series is a flagship initiative dedicated to raising awareness and promoting action for the protection and sustainable development of mountain regions in Southern Africa – defined as Africa south of the Congo rainforest and Lake Rukwa, and including the Comoros, Madagascar, and Mascarenes. It is jointly led by three primary partners: the UFS Afromontane Research Unit, the Global Mountain Safeguard Research Programme (GLOMOS – a collaboration between Eurac Research in Italy and the United Nations University in Germany), and the African Mountain Research Foundation (United Kingdom). It is implemented by the Peaks Foundation, an NPO focused on capacity building and event management. Promoting knowledge exchange, policy engagement, and transboundary dialogue, the SAMC series aims to strengthen regional networks and to better position African mountains within global mountain agendas. Two SAMC events have had official UNESCO patronage, and wide-ranging sponsorship support.



SAMC2022:

Laying the foundation for mountain futures



Following SAMC2022, Prof Sandy-Lynn Steenhuisen (ARU/Plant Sciences) hosted a field excursion for international RangeX collaborators from Switzerland, Norway, Denmark, and Germany to the Afromontane Research Unit's Witsieshoek alpine research site at 3 100 m.

Photos: Sandy-Lynn Steenhuisen



Held from 14 to 17 March 2022 in the Maloti-Drakensberg, the inaugural Southern African Mountain Conference (SAMC2022) established a new benchmark for regional mountain collaboration. Themed *Southern African Mountains – Their Value and Vulnerabilities*, SAMC2022 brought together 259 delegates from 21 countries under UNESCO patronage and showcased 166 papers across six parallel tracks, spanning ecological, cultural, and policy dimensions. Workshops addressed climate monitoring, invasive species, biodiversity data, and water systems. A strong emphasis on youth engagement and capacity building helped boost African representation at global platforms, such as the International

Mountain Conference in Austria in September 2025.

A special issue of *Transactions of the Royal Society of South Africa* followed, featuring nine peer-reviewed papers. These articles reflected geographical breadth, from the Maloti-Drakensberg and Kaokoveld to continent-wide analyses, and thematic diversity across biophysical sciences, humanities, and multidisciplinary approaches. The research supported the need for context-aware, cross-disciplinary work to inform sustainable mountain interventions.

SAMC2022 also spurred momentum for future events, including the German Embassy-funded *Preserving*

the Dragon’s Heritage workshop. Its legacy continues to shape mountain research, policy, and practice, setting the stage for SAMC2025 and a growing community of practice across Southern Africa’s mountains.

Top and bottom: More than 200 delegates gathered in the Maloti-Drakensberg at SAMC2022 – a landmark event that set the tone for future mountain research, collaboration, and policy across Southern Africa.

Photos: SAMC2022



Strengthening collaboration for Southern African mountain sustainability

Held from 17 to 20 March 2025 under the theme *Southern African Mountains – Overcoming Boundaries and Barriers*, SAMC2025 marked a major milestone in advancing mountain-focused collaboration across the region. Once again under UNESCO patronage, with 313 delegates from 22 countries – including strong representation from SADC member states, traditional leaders, and international organisations – the conference built on the momentum of SAMC2022.

Key highlights included 249 presentations across eight parallel tracks, seven strategic breakaway sessions, the inaugural Royal Mountain Indaba, and a dynamic arts and humanities programme. SAMC2025 promoted regional co-operation, introduced a formal proposal for a SADC Mountain Treaty, and contributed meaningfully to the United Nations' Five Years of Action for Mountain Regions (2023-2027). A key moment was the first-ever premiere of a film at a SAMC event, with *Qwaqwa – place of Barriers and Bridges* being part of the opening ceremony.

The opening ceremony was a prestigious event, with welcome statements from Prof Roland Psenner (President of Eurac Research, Italy), Alex Hickman (Founding Trustee and Chair of the African Mountain Research Foundation, United Kingdom), Prof Hester Klopper (Vice-Chancellor and Principal of the University of the Free State, South Africa), Sara Manuelli (Mountain Partnership Secretariat, Food and Agriculture Organisation of the United Nations, Italy), Ndapanda Kanime (Secretariat of the Southern African Development Community, Botswana), and His Excellency Ambassador Mirko Manzoni (Ambassador of Switzerland to South Africa and the SADC region);

official opening by Leluma Matookane (Director: Earth Systems Science, National Department of Science, Technology and Innovation, South Africa); and official welcome by Dr Kelly Cerialo (Programme Specialist, UNESCO Man and the Biosphere Programme, France).

The special breakaway sessions at SAMC2025 were a defining feature of the conference, offering targeted platforms for advancing strategic themes in mountain sustainability. These sessions moved beyond disciplinary silos, drawing together diverse expertise to address pressing ecological, cultural, social, and governance challenges.

Bringing the humanities into sharper focus, *African Mountainscapes and the Anthropocene* explored mountains as cultural, philosophical, and epistemological spaces. With 23 papers and several panel discussions, the stream spanned disciplines from indigenous knowledge systems to film studies and gender, culminating in a special issue of the journal *Transformation: Critical Perspectives on Southern Africa*. An edited volume with chapters developed from papers presented at the conference is also planned.

Sponsored by ReNOKA, water governance took centre stage in *Management of Transboundary Water Resources: Perspectives from the Source*, where experts from SADC, the Orange-Senqu River Commission (ORASECOM), Lesotho Highlands Development Authority (LHDA), and others discussed upstream perspectives and the role of mountain ecosystems in basin-level cooperation.

In a session hosted by the SADC Secretariat and the MDTP, *Promoting Transboundary Ecosystem Linkages*

examined how transfrontier conservation areas support biodiversity, tourism, and community development. Recommendations included inclusive conservation and sustainable financing. The session was organised by a multi-party committee led by Joyce Loza (MDTP), with participation from South Africa's Department of Forestry, Fisheries and the Environment (DFFE). Sponsorship was provided by the Joint Action NaturAfrica / Climate Resilience and Natural Resource Management (C-NRM) programme, co-funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the European Union.

Led by the Alpine Convention and GLOMOS, policy innovation was at the heart of *Towards a Southern African Mountain Treaty/Convention*, which proposed a formal framework for mountain governance aligned with SADC Vision 2050. The session led to a proposal for review by SADC ministers.

Organised by the AMRF and the University of KwaZulu-Natal and sponsored by Campbell Scientific, technical capacity building came into focus with *Measurements on Mountains and Automatic Weather Station Technologies*, where participants received hands-on training in environmental monitoring using Campbell Scientific equipment, which addressed data gaps in remote mountain regions.

Biodiversity experts convened for *Towards an African Mountain Biodiversity Assessment*, launching a continent-wide initiative to assess mountain species and ecosystems. The session produced 20 priority research questions and will be coordinated through the ARU's GMB Southern African Hub.

Carbon science and market mechanisms were critically examined in *Contextualising African Mountain Carbon*. Presentations addressed carbon dynamics, modelling, and offset schemes, while a closing panel interrogated the credibility of current approaches.

Traditional leadership was elevated through the *Royal Mountain Indaba*, a landmark gathering of royal authorities, academics, and policymakers, as a step towards bringing traditional authorities – who have custodianship over major areas in Southern African mountains – into the mountains and sustainable development goals conversation.

Supported by the Centre for Development and Environment (University of Bern), future leadership was nurtured in the *Early Career Summit*, where more than 30 emerging researchers engaged in training, mentorship, and peer exchange. Topics ranged from publishing and funding to citizen science and career pathways, strengthening the pipeline of mountain research expertise.



Karabo Moloi (Plant Sciences) was interviewed for the *Qwaqwa - Place of Barriers and Bridges* documentary, which premiered at SAMC2025. The cameramen are Adam Asmal (far left) and Grant Atinkson (left).

Photo: Sandy-Lynn Steenhuisen



More than 300 delegates attended SAMC2025 in the northern Maloti-Drakensberg – building regional momentum for mountain sustainability, policy innovation, and inclusive collaboration across Southern Africa.

Photo: SAMC2025

Strengthening mountain governance through royal partnerships



The ARU and the two Royal Houses in Qwaqwa have partnered on strengthening mountain governance and leveraging benefits for rural mountain communities through conservation, rangeland management, and accessing the biodiversity economy. (Top left) Ntate Sechaba Motsumi (environmental adviser: Bakoena Royal Council), (top) Morena e Moholo ba Mopeli (King: Bakoena Royal House), and (top right) Prof Ralph Clark (ARU Director) in the field near Fika Patso Dam, Namahadi.

Photo: Ralph Clark

The ARU has cultivated strong partnerships with the Bakoena ba Mopeli and Batlokoa ba Mota Royal Houses to advance mountain stewardship in the Qwaqwa Maloti. These Royal Houses, led by Morena Moremoholo Mopeli and Morena Montoeli Mota respectively, are recognised custodians of the Qwaqwa Maloti and have played an instrumental role in bridging traditional governance with scientific expertise and sound business partnerships such as Witsieshoek Mountain Lodge.

Central to this collaboration is the proposed Witsieshoek Natural Protected Environment (NPE, to be renamed the Qwaqwa Maloti NPE) – 220 km² of true wilderness

area. Originally initiated by the Maloti-Drakensberg Transfrontier Programme, the NPE will integrate fire management, rangeland restoration and governance, biodiversity conservation (including local populations of medicinal plants), appropriate rewilding of indigenous antelope such as the Cape eland, and transboundary security (stock theft is a major challenge) across a culturally significant landscape.

This will enable the houses to ‘reclaim’ the mountains under their traditional custodianship, and for their communities to access wider benefits from opportunities in the biodiversity, tourism, carbon, water provisioning, bioprospecting, wildlife, and red meat (rangeland) economies.

Close cooperation between the environmental adviser to the houses, Ntate Sechaba Motsumi, and the ARU has already seen major improvements in Qwaqwa Maloti fire management, and movement on the NPE. A second goal would be to become part of a biosphere reserve proposed by the Endangered Wildlife Trust – an area along the Great Escarpment from Memel to Golden Gate Highlands National Park as part of the Northern Drakensberg Strategic Water Source Area.



For additional information, read: [Research unit uncovers more about less-explored mountains.](#)



The Upper Kgoptjwane Gorge is a major landscape feature in the proposed Witsieshoek Community Conservation Area. This area would be a legally proclaimed natural protected environment covering the entire Qwaqwa Maloti as a traditional authority-governed conservation space.

Photo: Ralph Clark



The Little Berg plateau in the Qwaqwa Maloti is a vast area that is underexplored by science and offers a major opportunity for diversifying livelihoods in Qwaqwa by incorporating the biodiversity economy. The ARU and Qwaqwa Royal Houses are working towards utilisation of this vast area for projects such as rewilding with indigenous antelope such as eland.

Photo: Anthony Mapaura



Witsieshoek Mountain Lodge – management authority of over 7 000 ha of mountain-land in the Qwaqwa Maloti on behalf of the Batlokoa Royal House – is a core partner of the ARU and a key site for many local and international collaborative research projects.

Photo: Transfrontier Parks Destinations

GMBA advancing mountain biodiversity research in Southern Africa



The ARU hosts the first African regional hub of the Global Mountain Biodiversity Assessment (GMBA), a global initiative coordinated by the University of Bern (Switzerland). Under the leadership of Prof Peter Taylor, ARU Professor in Residence and affiliated with the Department of Zoology and Entomology, the hub plays a pivotal role in mobilising mountain biodiversity expertise across Southern Africa to contribute to global narratives.

This regional hub supports the GMBA's mission to foster inclusive, cross-cutting research and capacity building. Through co-authorship networks, partnerships with institutions, and alignment with events such as the SAMC series, the hub strengthens regional collaboration. Its activities are geared towards contributing to the GMBA's first global biodiversity assessment, while promoting data sharing, training, and policy-relevant outputs for mountain conservation in Southern Africa.



The ARU hosts the first African GMBA regional hub, designed to advance mountain biodiversity science and collaboration across Southern Africa. Members of the ARU's Witsieshoek BioBlitz team are pictured here with the Amphitheatre in the background.

Photo: ARU



Prof Patrick Voua Otomo (right; Director: Centre for Global Change) in his lab conducting innovative research with Sanele Mnkandla (left; Zoology and Entomology) – who was also an IMC2025 travel grant winner at SAMC2025) – to tackle water pollution in Qwaqwa.
Photo: Sonia Small

Spinning off the Centre for Global Change as a sister unit

From 2020 to 2023, the Centre for Global Change (CGC) was originally housed within the ARU as the Risk and Vulnerability Science Centre (RVSC) under the curatorship of Prof Clark, with contract assistance from Prof Hamisai Hamandawana for two of those years.

The theme of the RVSC was *The sustainable development of Phuthaditjhaba as an African mountain city* – from the ARU Strategic Plan. During the four years of the RVSC, a wide range of academics, postdocs, and postgraduate students across three faculties were supported. Major events included the Global Change Conference in Bloemfontein in January 2023, where numerous awards were received by the team. Other key support was provided for attendance of a Mountain Summer School in Hungary, the World Climate Research Programme (WCRP) Open Science Conference in Rwanda, representation by the Bakoena Royal Council in Qwaqwa at the Future Adaptations Conference (online), and

sending community representatives to the United Nations Global Mountain Safeguard Programme Mountain Innovation Fair (Italy).

The RVSC provided a student computer lab, a 4x4 research vehicle, various field equipment, and the ARU Alpine Base. The RVSC also co-supported early and pilot projects or programmes that, with other funding, have emerged into flagship aspects of the ARU's portfolio; these included the Malagasy Mountain Programme, the Mont-aux-Sources LTSER, the invasive *Nassella* grass programme, and the Eland Rewilding Project.

The RVSC created the momentum for a structured long-term monitoring protocol in Qwaqwa on water health (water quality and ecotoxicology), alpine systems research (with high carbon storage and water production value), and biodiversity. The RVSC has grown the relationship between the ARU and the two Qwaqwa Royal Houses very prominently.

In 2024, the CGC was spun off from the ARU as a sister unit on the Qwaqwa Campus, with Prof Patrick Voua Otomo (Department of Zoology and Entomology) as the lead.

The theme also evolved into a focus on the 'Water-Energy-Civic Discontent Nexus' in Qwaqwa, building on the Ecotoxicology Lab of Prof Otomo as the core. Before and after the evolution of the CGC, Prof Otomo's work focused on river pollution and wastewater treatment failures in the Qwaqwa region, with an emphasis on remediation research, including biochar amendment of sewage sludge and mycofiltration using mushroom mycelia to reduce water pollution.

The CGC programme is a flagship initiative under South Africa's Global Change Research Plan, supported by the Department of Science and Innovation and implemented by the National Research Foundation.



PILLARS OF PURPOSE: ARU'S HIGH-IMPACT INITIATIVES

A late winter scene from the Ankaratra massif – Madagascar's third highest mountain. The Malagasy Mountain Programme – initiated by the ARU – seeks to deepen our understanding of Malagasy mountains as social-ecological systems, and to strengthen Southern African collaboration with Malagasy partners.

Photo: Jay le Roux and Joro Rakotoarivelo

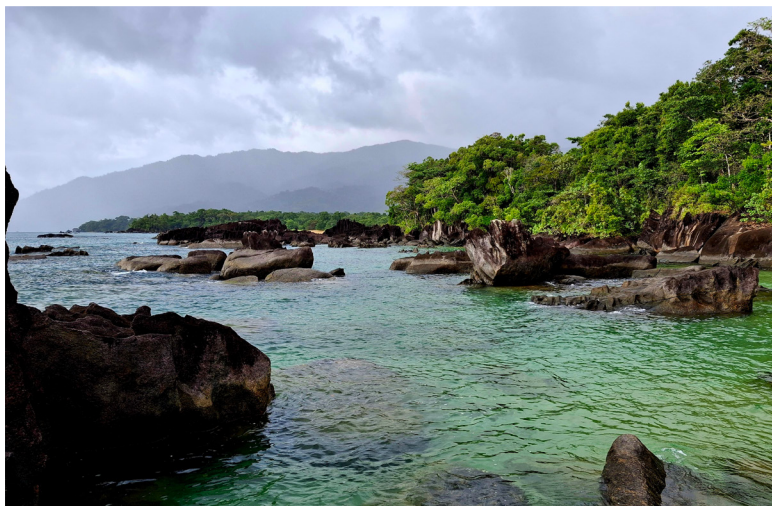
Advancing mountain social-ecological understanding through the Malagasy Mountain Programme

The Malagasy Mountain Programme is a dynamic South-South collaboration between the Afromontane Research Unit (ARU), Association Vahatra, and the University of Antananarivo – as well as a growing set of other partners – aimed at promoting research on Madagascar’s high-elevation massifs. These montane systems, many above 2 000 m, are among the least studied on the island, despite their ecological and cultural significance.

Under a social-ecological systems paradigm, the programme explores biodiversity, fire ecology, climate change, invasive species, and

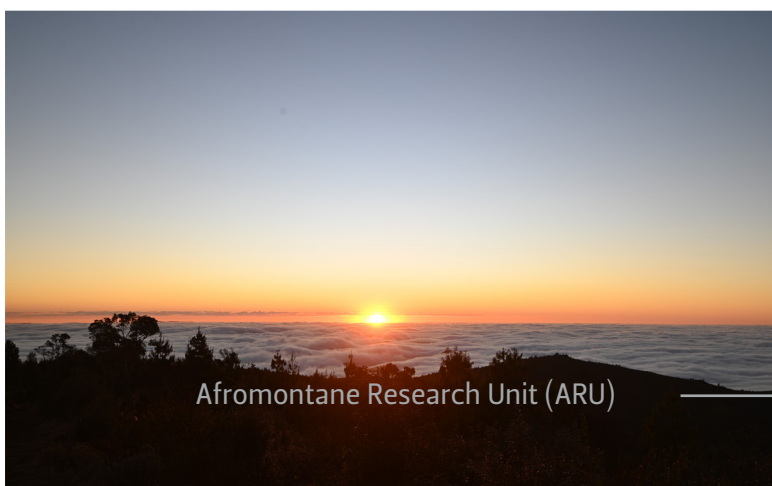
governance, while supporting restoration and conservation efforts.

The initiative builds capacity through exchanges, joint supervision, and collaborative fieldwork between Madagascar and South Africa. It encourages co-learning between Malagasy and continental researchers, supports field schools, and actively scans for external funding to sustain long-term collaboration. The programme also aims to strengthen South-South partnerships and integrate Madagascar more closely into the Southern African mountain community of practice and representation on global mountain platforms.



The Masoala mountain range in north-eastern Madagascar rises from sea level to over 1 300 m – a similar elevation difference to parts of the Maloti-Drakensberg.

Photo: Jay le Roux



Sunrise from the Ankaratra massif, the third-highest mountain range in Madagascar and part of the Malagasy central highlands and associated escarpment.

Photo: Joro Rakotoriavelo

Linking the ARU to African mountain research through the SEAMA biogeographic ecoregion



The complex montane landscapes of northern Mozambique – part of the South East Africa Montane Archipelago (SEAMA) ecoregion – where unique biodiversity and isolated peaks hide hidden mountain treasures. Here, Prof Julian Bayliss (Fellow) – expedition leader for the Mt Mabu Conservation Project – is pictured on the left, on Mt Mabu.

Photo: Mt Mabu Conservation Project

The South East Africa Montane Archipelago (SEAMA) is a newly described biogeographic ecoregion, formally announced by Prof Julian Bayliss at SAMC2022. Stretching across northern Mozambique and southern Malawi, SEAMA includes iconic sites such as Mount Mabu, Mount Namuli, Mount Lico, and Mount Chipirone; each hosting extraordinary biodiversity and unique montane ecosystems. Prof Peter Taylor's research on

bats and small mammals has helped profile SEAMA's ecological distinctiveness. Fifteen years ago, he started collaborating with Prof Bayliss and became involved in the wider SEAMA project when several new vertebrate and invertebrate species were being discovered from isolated 'inselbergs' in northern Mozambique, including a new species of bat, the Mount Mabu horseshoe bat *Rhinolopus mabuensis*. The project supports the ARU's mission,

contributing to mountain-related policy and governance from an African perspective, thus balancing a predominance of mountain research driven from the Global North and Northern Hemisphere. The ARU postdoctoral researcher (Department of Plant Sciences), **Dr Anthony Mapaura**, also participated in a 2024 expedition to Mount Mabu, further strengthening the ARU's role in the Mozambique Mountain Initiative.

Alpine studies in Africa (ARU Alpine Lease Area, RangeX EU Biodiversa)

The Maloti-Drakensberg has the only alpine region in Africa south of Mount Kilimanjaro. This isolated high-elevation system is facing many challenges, including real-time rangeland degradation and climate warming. Yet, despite this alpine ecosystem – larger in area than many small countries – being critical to the Maloti-Drakensberg’s functioning as a water tower in Southern Africa, there is a very poor understanding of its ecology and processes. To remedy this, the ARU has initiated the first long-term and comprehensive alpine research programme in the Maloti-Drakensberg, using the alpine area at Witsieshoek – just 30 km from the university’s Qwaqwa Campus – to create a ‘field laboratory’ in the form of the Mont-aux-Sources Long-term Social-Ecological Research Site for single-discipline through to transboundary alpine studies.



Pictured (top and bottom) is the Witsieshoek-ARU Alpine Base – situated at 3 100 m elevation below the Mont-aux-Sources ridge (Maloti-Drakensberg) – the home of alpine research in the Maloti-Drakensberg. Located in the ARU’s Alpine Lease Area at Witsieshoek, it is the hub of the core instrumentation area for the Mont-aux-Sources Long-term Social-Ecological Research Site.
Photos: Ralph Clark

The Mont-aux-Sources Long-term Social-Ecological Research Site

The ARU Alpine Lease and Base provide the first core instrumentation area for the transboundary Mont-aux-Sources Long-term Socio-Ecological Research Site (MaS-LTSER). Led by Prof Johan van Tol, who is affiliated to the Department of Soil, Crop and Climate Sciences, MaS-LTSER is an ILTER-registered platform linked with the South African Environmental Observation Network (SAEON) for understanding global change in the alpine area of the Maloti-Drakensberg, which includes both Lesotho and South Africa. The MaS-LTSER platform is a

place-based infrastructure for transdisciplinary collaboration. It brings together researchers, competent authorities, and local stakeholders to address sustainability challenges in vulnerable alpine environments.

Supporting information is available here:



LTSER platform working to restore and maintain the environment



MaS-LTSER facilities



Introducing the MaS LTSER



ARU Alpine Base and Alpine Lease Area



In 2021, the ARU – with internal UFS support – successfully negotiated a sub-lease with Witsieshoek Mountain Lodge for the 250-ha alpine area under their custodianship. The lodge stewards this land on behalf of the Batlokoa Traditional Authority. The lease area – situated on top of the Maloti-Drakensberg and bordering the Royal Natal National Park (including the Amphitheatre with the world’s highest waterfall, uThukhela Falls) and Lesotho –

includes some of the highest ground in the Free State and provides a focus area for alpine research instrumentation and projects. The lease enabled the resurrection of the Namahadi Border Post as an alpine research facility and hiker cabin: situated at 3 100 m, it is the highest structure in the Maloti-Drakensberg and the 21st highest hut in Africa. In March 2024, the Alpine Base reached a key milestone with the completion of its final ‘soft infrastructure’

upgrades, including upgraded solar power installation, post-winter structural maintenance, and cold-resilience enhancements, sponsored by the African Mountain Research Foundation. This finalisation marks the transition from foundational setup to full operational capacity, positioning the site as a continental hub for alpine experimentation, climate adaptation research, and transboundary conservation science.



On the Roof of the Free State at 3 300 m elevation – researchers rest in the alpine zone of the Qwaqwa Maloti – 30 km away from the Qwaqwa Campus, but 1,6 vertical kilometres higher.

Photo: Sakkie du Plessis



Prof Ralph Clark (ARU Director) presenting to a group of green investors and business leaders at the launch of the African Mountain Research Foundation (AMRF) in London in February 2020. The AMRF is a UK-based charitable trust aligned with the ARU for boosting research and a community of practice for Southern African mountains, and is a primary partner on the Southern African Mountain Conference series.

Photo: AMRF

Understanding alpine response to climate change: 'RangeX' at Witsieshoek

The 'RangeX' project, which ran from 2021 to 2024 as part of the EU BiodivERsA programme, ushered in a new era of alpine ecological experiments in Southern Africa. With the work of ETH Zürich's Prof Jake Alexander, this global initiative explored how climate change is driving plants to expand their ranges across mountain gradients, altering community dynamics, influencing biodiversity and ecosystem functions, and

creating new management challenges. Mountains, valued for their biodiversity, yet highly vulnerable to warming and biological invasions, provide ideal model systems for this work. Comparative field sites in Argentina, Australia, China, Norway, Switzerland, Sweden, and South Africa ensure that findings are globally relevant. Led by South African PI Prof Ralph Clark and co-PI Prof Sandy-Lynn Steenhuisen from the UFS Department of Plant

Sciences, also supported by intensive local groundwork from Dr Ona Gwate (former postdoc, now fellow) and Dr Stephanie Payne (former postdoc), 'RangeX' enabled South Africa's first-ever alpine open-top chamber experiment. Combined with camera traps, the project has delivered the first detailed understanding of seasonal alpine ecology and its potential shifts under climate warming.



(From left) Dr Stephanie Payne (Fellow) and Prof Sandy-Lynn Steenhuisen (ARU/ Plant Sciences) with Ntate Leluma Matooane (Director: Earth Systems Science, Department of Science, Technology, and Innovation) on a site visit by helicopter to the RangeX project site at Witsieshoek.

Photo: Sandy-Lynn Steenhuisen



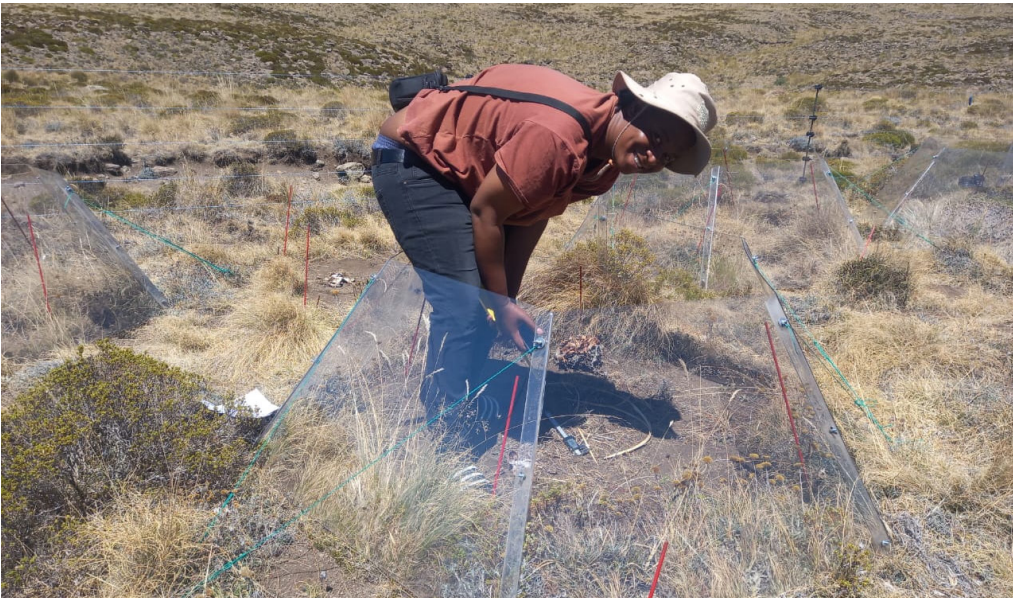
Members of the EU Biodiversa-funded RangeX consortium – including the ARU – at the Swiss project site near Calanda in the Swiss Alps.

Photo: Sandy-Lynn Steenhuisen



Members of the RangeX consortium – which is part of the Mountain Invasion Research Network (MIREN) – ran a dedicated MIREN workshop and RangeX focus session at the International Mountain Conference in Austria in 2022. The ARU participated in both events.

Photo: MIREN



Lesego Malekana (Plant Sciences) measuring plant traits of transplanted plants in an open-top chamber on the Maloti-Drakensberg as part of the internationally collaborative RangeX project, with the South African component managed by the ARU.

Photo: Sandy-Lynn Steenhuisen



The RangeX open-top chamber site at the top of the Maloti-Drakensberg.

Photo: ARU

Remediating alpine wetland degradation and carbon loss

A key focus of the MaS-LTSER platform is the degradation of alpine wetlands in the Maloti-Drakensberg, many of which are already severely impacted.

This degradation poses a serious threat to ecosystem services and local livelihoods. From a regional water supply perspective, these wetlands play a crucial role in sustaining baseflows during dry periods, supporting communities both locally and downstream. The Maloti-Drakensberg are particularly

important, as they form the headwaters that supply water to Gauteng through the Lesotho Highlands Water Project.

In response, the MaS-LTSER platform collaborates with interested and affected parties to restore and maintain these critical landscapes. A major objective is to quantify existing carbon stocks across different land uses and varying degrees of degradation, in order to demonstrate the potential of alpine peatland restoration for carbon sequestration.

The resulting carbon credits could serve as attractive offsets for the private sector, particularly large diamond mining operations. Although formal agreements have not yet been finalised, active collaboration already exists through data sharing and student training initiatives.

Through knowledge exchange and inclusive stakeholder engagement, the platform aims to develop long-term, sustainable solutions to the region's socio-ecological challenges.



Dr Anthony Mapaura (left) and Prof Sandy-Lynn Steenhuisen (ARU/Plant Sciences) navigating the Kleinspruit Wetland in the Golden Gate Highlands National Park as part of the ARU's first wetland bioacoustics project.

Photo: Supplied

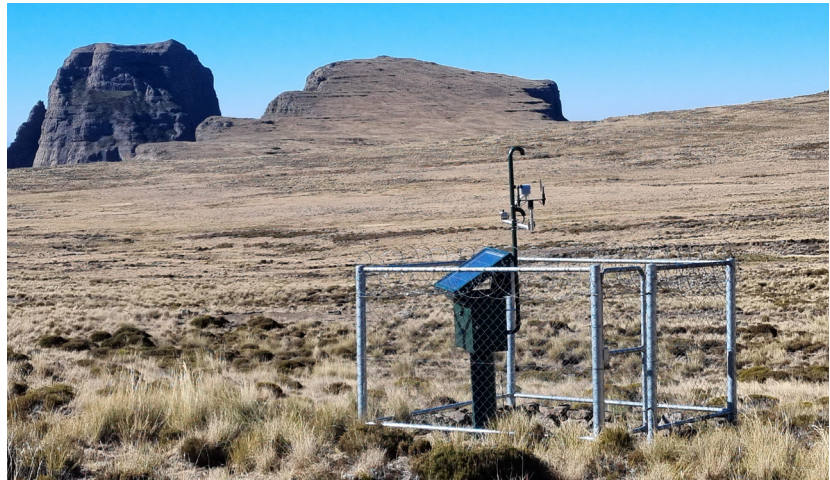
Alpine wetlands in the Maloti-Drakensberg – vital headwater ecosystems under pressure, now central to restoration and carbon offset initiatives.

Photo: Ralph Clark



UFS weather stations – an elevation transect–first in Southern Africa

As part of the ‘Mountain to Mountain’ programme funded by the US Embassy to South Africa, an elevation transect of four weather stations was installed in the northern Maloti-Drakensberg, with a fifth at UFS-QQ. Spearheaded by Prof Geoffrey Mukwada (ARU/Department of Geography, now retired) and Prof Grey Magaiza (ARU/Community Development/Centre for Gender and Africa Studies), this is South Africa’s only elevation transect of weather stations – and possibly the only one of its kind in Africa.



South Africa’s only elevation transect of mountain weather stations is located in the northern Maloti-Drakensberg and provides real-time data across 1,8 vertical kilometres (1 300 to 3 100 m). Six stations – five UFS and one SAEON – provide mountain meteorological data but require intensive management for the instruments/sensors to remain functional in the extreme conditions. Maintenance support and funding is provided by the African Mountain Research Foundation.

Photo: Supplied

The stations are part of the core instrumentation of the MaS-LTSEER and also complement other instrumentation in SAEON’s Northern Drakensberg EFTEON Landscape. The array spans 1,8 vertical kilometres (1 300–3 100 m), enabling researchers to track climate variability from lowland to alpine summits. Technical support was provided by Prof Jesse Lutabingwa (Appalachian State University), Prof Alistair Clulow (University of KwaZulu-Natal), and Zandile Mncube (Geography, and a prospective ARU champion once her PhD is awarded), with annual servicing and recalibration funded by the African Mountain Research Foundation.

A sixth station – fifth in the elevation transect – will be installed by the Northern Drakensberg EFTEON team at 3 300 m in the ARU Alpine Lease area near the border with Lesotho in November 2025. A snow gauge with support from the Department of Geography is anticipated in 2026.

The stations have already shown high value, providing live feeds of real-time data on temperature, wind speed, humidity, and precipitation. In June 2025, the Sentinel Car Park station captured wind speeds of more than 170 km/h during a cold front – conditions comparable to Category 2 hurricanes.

 Access supporting information here: [ARU Weather Stations](#)



Prof Geoffrey Mukwada (ARU/Geography) – in collaboration with Appalachian State University (USA) – pioneered the weather station transect as part of the Mountain-to-Mountain programme with funding from the US Embassy to South Africa.

Photo: Leonie Bolleurs



Prof Grey Magaiza (ARU/Community Development) – as South African lead of both the Mountain-to-Mountain programme and UK-SA University Staff Doctoral Programme – has advanced community engagement and university staff research capacity development for Southern African mountains at two South African universities.

Photo: Sonia Small

Blending biophysical and social sciences in the alpine of South Africa and Norway



Norwegian collaborators from the University of Bergen – Dr Dagmar Engelkraut (left), Dr Aud Halbritter (centre), and Prof Vigdis Vandvik (right) – enjoy a rare clear summer’s day during fieldwork for the Norway–South African Bilateral project NatuRA at Witsieshoek.

Photo: Imke Smit

The ARU has secured two prestigious Norwegian–South African grants – NatuRA and INTEREST – totalling R17,5 million. Both grants are a partnership between the Universities of Bergen, Free State, Pretoria, and Venda, in transdisciplinary co-operation with the Bakoena and Batlokoa Royal Houses in Qwaqwa, Witsieshoek Mountain Lodge, and rangeland farmer co-operatives in Norway.

NatuRA focuses on sustainable resource use in mountain grasslands under global change, integrating ecological data and traditional knowledge from the Qwaqwa Maloti and Norwegian Fjordlands. It builds on the ARU’s ‘RangeX’ experiment

and adds the first comprehensive social research aspect to the Montaux-Sources Long-term Social-Ecological Research Site.

Conceptualised by Dr Aud Halbritter (University of Bergen) – overall consortium PI – NatuRA is led in South Africa by Prof Ralph Clark, with a multidisciplinary team of ARU champions (including Dr Melissa Hansen, Solomon Zondo, Ntebohiseng Sekhele from Geography, Prof Johan van Tol, and others), Prof Pete le Roux from the University of Pretoria, and Prof Lourens Swanepoel from the University of Venda.

Non-academic partners are Meat Naturally and the two Royal Houses.

INTEREST, funded through Norway’s NORPART programme, deepens this collaboration by linking ecological research and education with societal knowledge needs on the nature crisis.

It enhances research excellence and capacity development between Norway and South Africa by establishing transdisciplinary collaboration, engaging young researchers, and supporting joint planning, analysis, and dissemination of ecological data.



Access the article, ARU secures two Norwegian–South Africa grants for mountain research, [here](#).



A drone photo of the NatuRA low site. To the left is the RangeX experiment, and to the right is the Three-D experiment containing plots that were transplanted from the mid to the low site.
Photo: Kobus Engelbrecht



A turf excavated from the NatuRA low site (2 200 m), creating space to receive one from the high site (3 050 m).
Photo: Imke Smit



Yondela Norman (left) and Dr Dagmar Engelkraut (right) carry a turf taken from the NatuRA mid site (2 600 m) towards the Sentinel car park for transport down to the low site (2 200 m).
Photo: Imke Smit



BergFlying's helicopter being loaded with turfs from the NatuRA high site (3 050 m) for transport down to the mid and low sites. BergFlying has provided specialist flying services to the ARU since 2021.
Photo: Imke Smit



A view from the NatuRA mid site (2 600 m) northwards along the escarpment shared by the Free State and KwaZulu-Natal. Excavated turfs for the low site (2 200 m) are boxed and ready for relocation.
Photo: Imke Smit

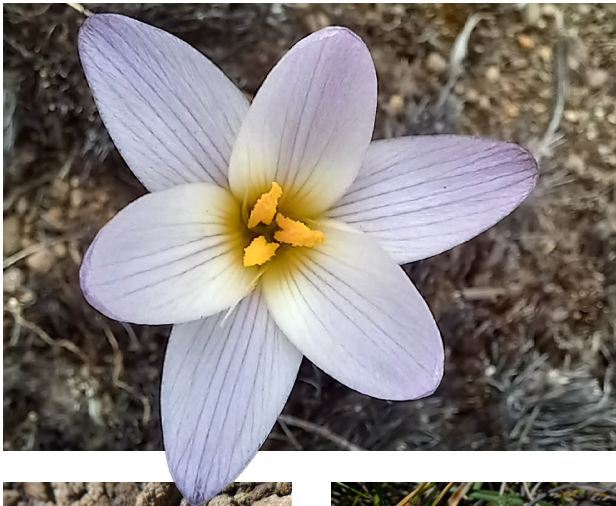
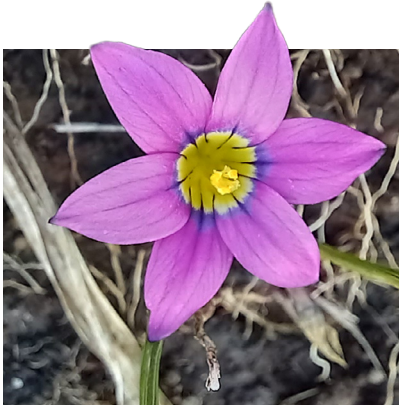
Mountain Invasion Research Network (MIREN) research at Witsieshoek



The globally active Mountain Invasion Research Network (MIREN) seeks to understand – using a locally replicable structured experiment – how non-native plant species are behaving in mountains. In the summer of 2021-2022, through the hard work of Dr Ona Gwate and visiting intern Marc Achermann (Lucerne University of Applied Sciences and Arts, Lucerne), with plant identification support from Dr Clinton Carbutt (Ezemvelo KZN Wildlife), the ARU placed a long-term MIREN transect at Witsieshoek – the first full protocol in South Africa and Africa. The site will be resurveyed in 2027 as part of the global resurvey of all MIREN sites.

The ARU – as the regional MIREN coordinator and represented on the MIREN steering committee by Prof Ralph Clark – has planned additional MIREN sites in other mountain ranges, pending funding, including Lesotho (where a trial trail protocol transect has been set up in the Ts'ehlanyane National Park), Madagascar, and Zimbabwe. There is also active collaboration between the ARU and UCT on a more recent MIREN transect in the Matroosberg (Western Cape).

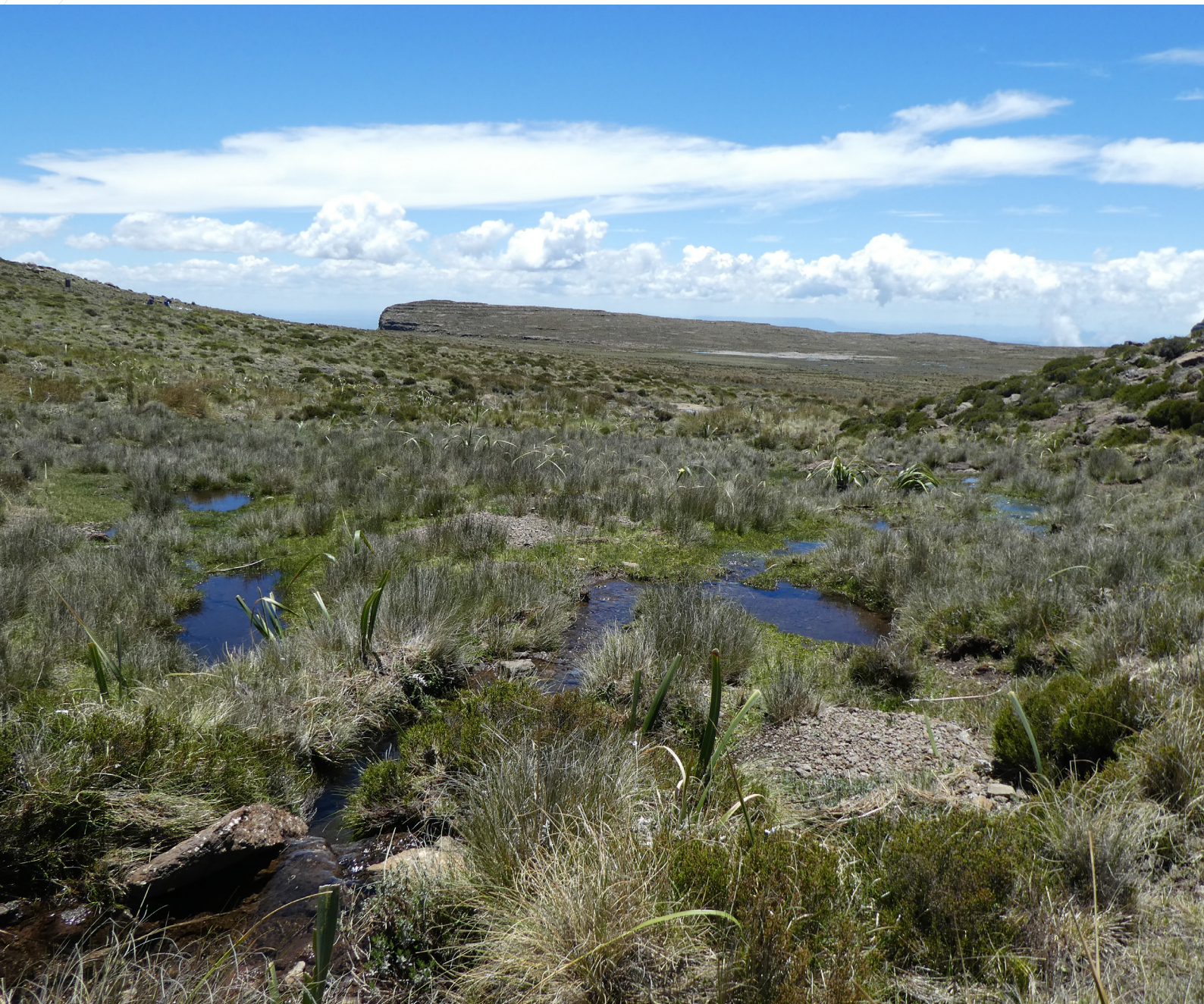




Endemic high-elevation plants in the Maloti-Drakensberg are increasingly vulnerable to invasive species moving up the mountains from a warming climate.

Photos: ARU

Alpine and Montane Biodiversity – Witsieshoek BioBlitz



More than 1 200 species were recorded in a high-altitude BioBlitz led by Prof Peter Taylor – with 174 found only above 2 800 m. Climate change threatens this unique biodiversity.

Photo: Ralph Clark

The Witsieshoek BioBlitz comprises the co-ordinated effort of numerous biodiversity scientists – led by Prof Peter Taylor – to document the faunal and botanical diversity of the 7 000 ha Witsieshoek Mountain Lodge precinct. To date,

five expert-led field expeditions and the mining of available data have documented more than 1 200 species of plants and animals – including 174 found only in the narrow but fragile alpine zone above 2 800 m elevation. Published in the journal *African*

Biodiversity & Conservation, these findings highlight the vulnerability of Maloti-Drakensberg alpine biodiversity to climate change and warn of ‘escalator to extinction’ risks in this imperilled hotspot.



Dr Stephanie Payne-Smith (left; Fellow) and Lesego Malekana (right; now a Swiss Government Excellence Scholar at ETH Zurich, Switzerland) identifying and cataloguing plant species for the Witsieshoek BioBlitz (February 2023).
Photo: ARU



Dr Karabo Mloi (Plant Sciences) and Muzikayifani Ndimande (Zoology and Entomology) received training from Prof Peter Taylor on how to ethically and safely process small mammals for research during the third BioBlitz at Witsieshoek Mountain Lodge.

Photo: ARU

African mountain flora, plant ecology, and climate change convention



Many African mountains have poorly explored plant diversity, and African mountain vegetation ecology does not feature significantly on global frameworks – especially native subtropical montane grassland and other non-woody systems. ARU research and partnerships have assisted in highlighting the exceptionally rich plant diversity and endemism in African mountains – and the especially high importance of native grasslands for African mountain plant endemism.

As a set of collaborations, the work includes taxonomic descriptions of new mountain plant species, mountain floras, and first-ever lists of mountain endemics, as well as applied global change implications.

Projects to date include new species descriptions from the Cape Midlands Escarpment (South Africa), a plant checklist for the Bvumba mountains (Zimbabwe-Mozambique, part of the Manica Highlands Initiative and elsewhere), the first-ever list of endemics for the super-endemic-rich Limpopo-Mpumalanga-Eswatini Escarpment, proposing the C_3 - C_4 'grass-line' transition as the basis for a global change monitoring protocol in grassy mountains, a first flora of the Qwaqwa Maloti, climate change implications for African mountain plant endemics, and fine-scale ecological processes in montane-alpine grasslands and tundra (led by Prof Pete le Roux, University of Pretoria). Importantly, the plant biodiversity and bio-inventory work feeds into SANBI's Red List of

South African Plants, ensuring that montane flora are represented in national conservation assessments and policy frameworks. The work contributes to the GMBA Southern African Hub.

Key ARU players in the programme are Prof Ralph Clark, [Dr João De Deus Vidal Júnior](#) (former ARU postdoc, current ARU/UFS Plant Sciences fellow, and current Von Humboldt fellow in Germany), Mos Bereng (curator of the Katse Dam Botanical Gardens and PhD candidate), and Dr Anthony Mapaura. Dr Robert McKenzie (fellow, UFS Department of Plant Sciences) is investigating the systematics, phylogeny, and climate-driven biogeography of Afromontane lineages in the Asteraceae tribe Arctotideae.



Top, from the left, Chris Willis (Chief Director: National Botanical Gardens), Prof Ralph Clark (ARU Director), Prof Francis Petersen (former UFS Vice-Chancellor and Principal), Lufuno Nenungwi (Free State National Botanical Garden), and Nondumiso Magjija (Free State National Botanical Garden) visiting the ARU Alpine Lease Area, Witsieshoek, July 2023. The Free State National Botanical Garden provided the ARU with a large donation of indigenous plants to kick start a botanical garden around the ARU at the UFS Qwaqwa Campus.

Photo: ARU and SANBI

Left, Dr João de Deus Vidal Júnior went from being an ARU Post-doctoral Research Fellow to a Von Humbolt Fellow in Germany, contributing to high-impact studies on African mountain plant diversity, endemism, and climate change.

Photo: Leonie Bolleurs



Field collecting in the Namahadi Cutback (December 2023) as part of the first systematic botanical exploration of the Qwaqwa Maloti – part of the ARU's contribution to documenting African mountain flora and endemism.

Photo: Mos Bereng

Access supporting information about the ARU's mountain flora and plant ecology research. Also read:



ARU secures two Norwegian-South Africa grants for mountain research



Late 21st-Century Climate and Land Use Driven Loss of Plant Diversity in African Mountains



"The best possible scenario for carrying on my ecological research"



Manica Highlands Initiative



From dream to reality: Indigenous university botanical garden for UFS Qwaqwa Campus

Manica Highlands transboundary conservation and research initiative

Spanning 8 500 km² across Zimbabwe and Mozambique, the **Manica Highlands** host rich biodiversity and provide vital ecosystem services to more than six million people. In 2023, coordination of the transboundary conservation and research programme was transferred to Dr Anthony Mapaura, postdoctoral fellow in the ARU, with secretariat support from the **African Mountain Research Foundation**. Recent milestones supported by the ARU include the first comprehensive plant checklist for the Bvumba Mountains, documenting 1 250 taxa and highlighting threats from invasive species such as Australian blackwood (*Acacia melanoxylon*), Kahili ginger (*Hedychium gardnerianum*), and bee bush (*Vernonanthura polyanthes*). Current efforts include the compilation of a bibliography of the mountains. A parallel review outlines seven key ecosystem services at risk and proposes a ‘science to policy to action’ agenda to guide sustainable management. The most recent accepted work (by Jonathan Timberlake of the Biodiversity Foundation for Africa and Prof Ralph Clark, in *Ecology and Evolution*) provides the first empirical synthesis of plants endemic to the Manica Highlands – more than 200 species, mostly endemic to montane grasslands.



Also read here: [ARU collaborates with Zimbabwe](#).

(Top) The endemic-rich Chimanimani Mountains, part of the Manica Highlands shared by Zimbabwe and Mozambique.

Photo: Ralph Clark

(Far right) *Helichrysum acervatum*, an everlasting/strawflower endemic to the Manica Highlands.

Photo: Ralph Clark

(Right) *Asclepias fimbriata*, a milkweed endemic to the Manica Highlands.

Photo: Ralph Clark

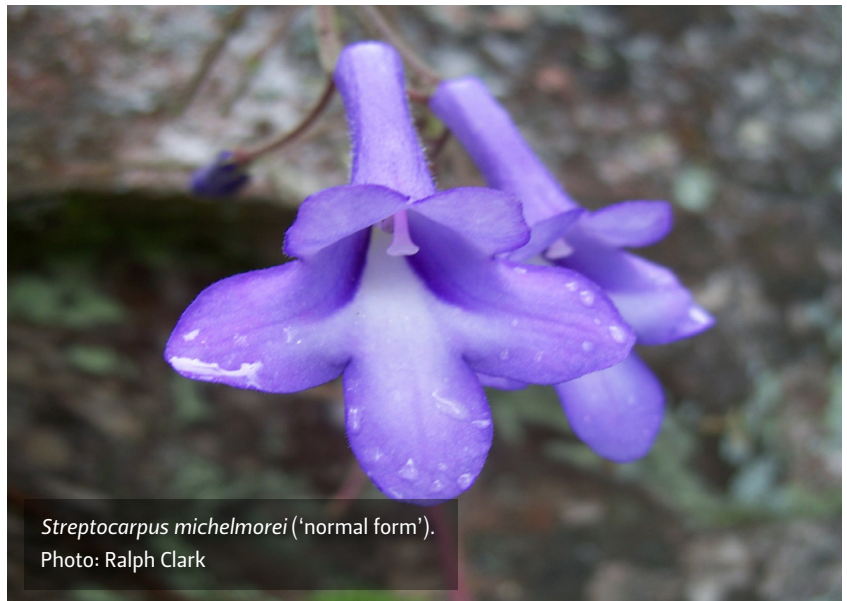




Leucospermum saxosum.
Photo: Ralph Clark



Erica johnstoniana.
Photo: Ralph Clark



Streptocarpus michelmorei ('normal form').
Photo: Ralph Clark

Forging a united front against mountain invasives

The tri-institutional nexus between the ARU, Centre for Biological Control (CBC, Rhodes University), and Centre for Invasion Biology (CIB, Stellenbosch University) is reshaping invasive species research in Southern Africa's mountain ecosystems. This research team has grown into a large group of passionate postgrads and postdocs – led by Prof Sandy-Lynn Steenhuisen (ARU and Plant Sciences) and Prof Grant Martin (CBC, Rhodes University and ARU/Plant Sciences fellow) – particularly Prof Aliza le Roux (ARU/Z&E), Kim Canavan (fellow, ARU/Plant Sciences), Prof Ralph Clark (ARU Director), and postdocs Dr Stephanie Payne and Dr Anthony Mapaura, and Ona Gwate (now a fellow, ARU/Plant Sciences).

A core focus topic is invasive woody plants in the rose family (Rosaceae), including firethorns (*Pyracantha*), sweet briar (*Rosa rubiginosa*), *Cotoneasters*, and the native ouhout (*Leucosidea sericea*) – which is becoming a major native woody encroacher into mountain grasslands/rangelands. This 'rose cocktail' of woodies is increasing fire risk and severity – including danger to livestock, infrastructure, and human life – as well as adding to existential threats to critically endangered grassland biodiversity. Strong emphasis is placed on reproductive ecology, and the roles of rodents and birds in facilitating or hindering invasions through seed spread or elimination. Management impact on these species was also the topic of 'RangeX' in South Africa, where pre- and post-invasion clearing was monitored along an elevation gradient to determine how clearing benefits grassland systems in recovery. The 'RangeX' project resulted in a special workshop on this topic at the Grassland Society of Southern Africa and a policy brief to the national Department of Forestry, Fisheries and the Environment. Biocontrol research on firethorns,

sweet briar, and *Cotoneaster* is also being considered.

The ARU has also led the charge in resurrecting research on the highly problematic invasive grass genus *Nassella*. Originally from South America, three species of introduced *Nassella* are rampant invaders in mountain grassland, particularly in the Eastern Cape province – causing major impacts on rangeland economies and grassland biodiversity. Similarly, ARU research shows that the formal and informal trade in pampas grass (*Cortaderia*) inflorescences (grass heads) in South Africa is a major source of invasion for these species, originating from South and Central America – also invasive in South African mountain grasslands. The ARU is monitoring and treating a small population of pampas grass at Witsieshoek, at 2 300 m elevation, to avoid it spreading further.

Black and silver wattles (*Acacia mearnsii* and *A. dealbata*) are among the world's worst woody invasive species. They have wreaked havoc in South Africa's grassland and fynbos biomes and riparian habitats. The ARU is contributing to investigating the impact and control of invasive wattles in the grassland biome of South Africa, including multidisciplinary research on water governance and wattle invasions. Similar woody challenges in the grassland biome have been researched for barberries (*Berberis*), privets (*Ligustrum*), locust tree (*Robinia*), willows (*Salix*), and other ornamental-origin invasive species.

The ARU – with support from Ezemvelo KZN Wildlife and a local landowner – is also assisting in containing the first pompom weed (*Campuloclinium macrocephalum*) population known in the Eastern Free State from spreading beyond its current invasion of a few square metres near the N3 outside Harrismith. This species, if allowed



Thembelihle Mbele (Plant Sciences) was awarded the best poster presentation at the National Symposium on Biological Invasions from 4 to 6 July 2023. She investigated the invasive status of pampas grass (*Cortaderia* species) in South Africa.

Photo: Sandy-Lynn Steenhuisen




Serrated tussock, *Nassella trichotoma*, is one of the worst invasive species in the Eastern Cape interior mountains - here in the Sneeuberg near Pearston.

Photo: Ralph Clark

to spread, would cause economic ruin for local rangeland-based economies, private landowners, and communal rangelands, as well as become a conservation nightmare. It has the potential to spread right across the region, including the Maloti-Drakensberg. Monitoring occurs from the first spring rains throughout summer into May, with flower heads physically removed for burning, and the plants treated with an appropriate herbicide.

The ARU is also contributing to host specificity and thermal tolerance research of the indigenous tortoise beetle *Gratiana spadicea* to determine its suitability as a biological control agent for sticky nightshade *Solanum sisymbriifolium* - a native South African plant that is invasive in Australia. Partners include Dr Andrew McConnachie (NSW Department of Primary Industries and Regional Development).

Access supporting information about the mountain invasives here:

 ***Leucosidea sericea* Review: Endemic darling or global change menace? A review of the woody encroacher *Leucosidea sericea* on the eastern Great Escarpment of southern Africa - ScienceDirect**



Woody shrub encroachment in mountain grasslands is raising fire risks and threatening biodiversity. Research focuses on how birds, rodents, and land management influence the spread and control of these invasive and native species.

Photo: Sandy-Lynn Steenhuisen



A dense infestation of the highly invasive Argentine grass *Nassella tenuissima* in the Eastern Cape Drakensberg.

Photo: Lumko Mboyi



Argentine grass *Nassella tenuissima* plants treated chemically by local landowners, Eastern Cape Drakensberg.

Photo: Lumko Mboyi

Threatened high-elevation grassland and wetland birds

Dr Kyle Lloyd (BirdLife South Africa and Fellow) conducting fieldwork in a highland wetland. BirdLife South Africa has been using acoustic monitoring to study the elusive white-winged flufftail to support the conservation of one of Africa's most enigmatic mountain species.

Photo: Siphon Ndebele



Most of Africa's most endangered bird species – except for island endemics – are typically confined to a combination of high-elevation grasslands and wetland systems. Some of these species are found in the ARU's 'backyard' – the Eastern Free State, and the adjacent southern Mpumalanga, western KwaZulu-Natal, and Lesotho – and the ARU has formed a strong collaboration with BirdLife South Africa to boost knowledge and conservation efforts on some of these species.

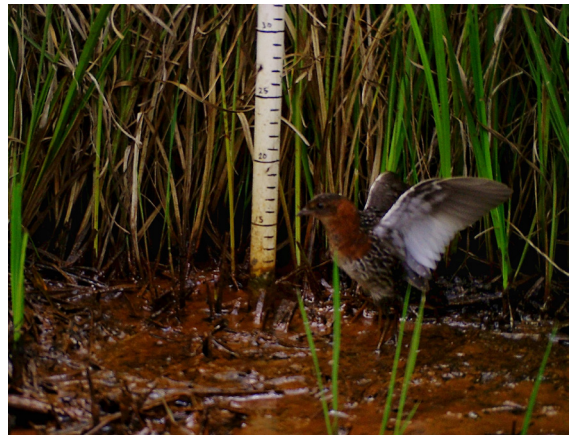
Dr Kyle Lloyd (BirdLife South Africa and ARU/UFS Department of Zoology and Entomology fellow) researches the critically endangered white-winged flufftail, using passive monitoring equipment to understand the ecology of this wetland specialist to inform conservation efforts that address habitat destruction and degradation. This includes developing guidelines and tools to empower people to better manage and protect the wetlands on their land. With strategic input on invertebrate and

environmental data from more than 80 high-elevation wetlands monitored by BirdLife South Africa, the ARU contributes directly to national wetland policy, ensuring that science informs conservation action. This research has contributed to the conservation status of the white-winged flufftail being downgraded from 'critically endangered' to 'endangered' in 2024.

As part of this initiative, the ARU adopted the 200 ha 'Kleinspruit' wetland in the Golden Gate Highlands National Park to determine whether there are birds of significance present, using passive acoustic devices to record birdsong over a two-year period. Led by Prof Aliza le Roux, with support from Profs Ralph Clark, Sandy-Lynn Steenhuisen, and Dr Nicholas le Maitre (former postdoc), the results have contributed significant new records to the Golden Gate Highlands National Park bird list, including several secretive species never before recorded in the park. The project also strengthened biodiversity inventories for the South African

National Biodiversity Assessment in poorly studied habitats such as large highland wetlands. The project was expanded to collaborate with Prof Peter Chatanga (National University of Lesotho) by exchanging skills in acoustic monitoring of birds in wetlands through a British Ecological Society grant.

The ARU – represented by Prof Ralph Clark – also participates in the Botha's Lark Working Group, led by Matthew Orolowitz of BirdLife South Africa. Botha's lark is currently considered to be the most endangered bird species in South Africa – with the entire known population occurring in the eastern parts of the Free State and southern Mpumalanga, numbering only around 300 individuals. It was recently uplisted from 'endangered' to 'critically endangered'. In October 2025, the ARU was part of a team that recorded 10 individuals – the only individuals recorded in the entirety of its known range during a focused atlas weekend organised by BirdLife South Africa, attended by some of the top birders in the region.



Critically important habitats – for more than just the birds

High-elevation wetlands and grasslands in Southern Africa are important biodiversity strongholds, but they are increasingly under threat. Many species that used to be characteristic of these systems have had dramatic population crashes in the past few decades, including the endemic Southern African subspecies of the Eurasian bittern – Africa's largest crane – the wattled crane, and the graceful montane grassland flagship species, the blue swallow. At the ARU, researchers and collaborators are advancing grassland and wetland science to safeguard these dynamic ecosystems and their cryptic species. Their work spans acoustic monitoring, invasive plant ecology, and mammalian behaviour, all supporting the protection of South Africa's montane 'water towers.'



High-elevation wetlands and grasslands; fragile mountain ecosystems that shelter rare species and sustain South Africa's vital water sources.

Photo: Siphon Ndebele

Research achievements and impact in mountain and fire studies



Prof Samuel Adelabu's (former Vice-Dean and current Fellow) work supports fire resilience in mountain landscapes where geospatial tools guide sustainable conservation and risk planning. Prof Adelabu was one of the first ARU Research Champions and contributed immensely to research and fire management policy in the Golden Gate Highlands National Park.

Photo: Samuel Adelabu

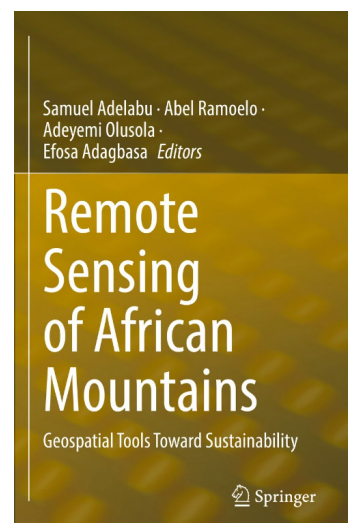
Prof Samuel Adelabu's (former Head of Department and now research fellow in the Department of Geography) research has made substantial contributions to understanding fire dynamics, ecosystem resilience, and environmental sustainability in mountainous regions of Southern Africa. His pioneering work integrates remote sensing, GIS, and machine learning to model and monitor fire danger, vegetation recovery, and ecological vulnerability in complex terrain.

Through projects funded by the ARU and the National Research Foundation (NRF) – including the development of a Framework for Fire Risk Assessment in Mountainous Areas – Prof Adelabu has generated spatially explicit models that inform fire management and conservation planning in protected areas such as the Golden Gate Highlands National Park. His studies on grass curing-driven fire danger indices, post-fire vegetation recovery, and lightning

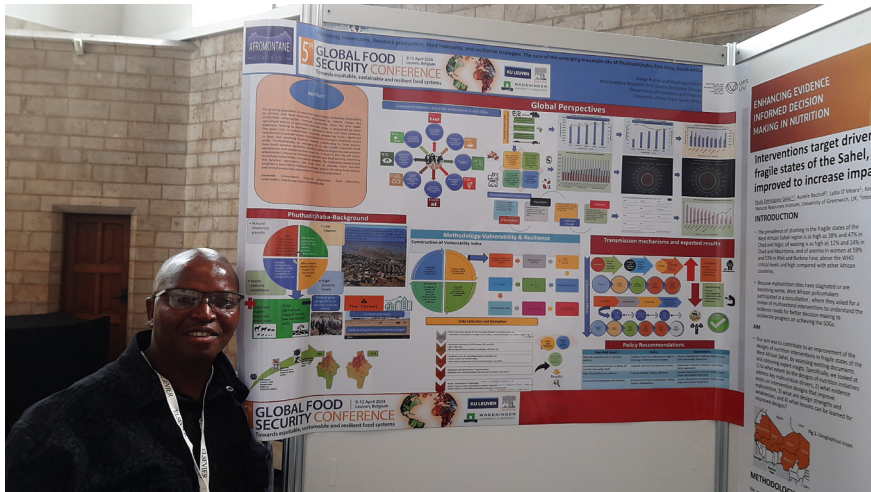
hazard mapping have enhanced predictive capabilities for wildfire risk and guided park management decisions.

As lead editor of the Springer volume *Remote Sensing of African Mountains: Geospatial Tools Toward Sustainability* (2022), he has advanced interdisciplinary collaboration on mountain research across Africa. His numerous Q1-ranked publications and international conference presentations (e.g., IEEE IGARSS, EGU Vienna) demonstrate leadership in linking geospatial innovation with environmental management.

Prof Adelabu's work continues to influence climate-fire-ecosystem research, enabling data-driven responses to fire hazards, biodiversity loss, and land-use change in fragile mountain landscapes. His approaches have set a benchmark for applying Earth observation science to sustainable mountain development and fire resilience strategies.



Exploring how poverty, economics, and sustainability interact in remote mountain communities



Dr Calvin Mudzingiri's research aims to track and suggest interventions for vulnerable communities living in mountainous regions.

Photo: Calvin Mudzingiri

The primary focus of Dr Calvin Mudzingiri and Dr Regret Sunge's (Department of Economics and Finance) research in the ARU is on exploring the intersections between economic systems, poverty, and sustainable development in marginal mountain communities. The research aims to track and suggest interventions to vulnerable communities, especially those living in mountainous regions. In 2024, they carried out a survey of 430 households. The data collected provides insights into major activities that anchor the livelihoods of households in the mountain communities in Phuthaditjhaba.

Preliminary results show that the households surveyed are mainly dependent on social grants. Many households have backyard vegetable gardens and keep indigenous chickens. There are also a sizable number of households owning cattle, sheep, goats, pigs, and poultry, among others. These activities help to boost food security and build resilience. In Phuthaditjhaba, some households live in poor housing structures and due to the risk of strong winds, several roofs are reinforced with stones. Households residing in houses with stone-reinforced roofs self-report higher risk perceptions of strong winds, showing that people

living in poor shelters are in constant fear of damage from strong winds. Preliminary results also show that households that rely mainly on social grants are vulnerable and may experience challenges if social grants are discontinued. They recommended that the government should switch from unconditional to conditional social protection expenditure in the long run, while gradually investing in access to and productivity of natural resources to enhance long-term economic resilience in households. They presented their research at SAMC2022, SAMC2025, and Leuven, Belgium.



Backyard chickens help families in Phuthaditjhaba improve food security.

Photo: Calvin Mudzingiri



Owning cattle and other livestock help boost food security and build resilience in rural households.

Photo: Calvin Mudzingiri

Japan-Qwaqwa transdisciplinary partnership for mountain-based transformation



The research team, alongside Qwakanda NPC, supports sustainable waste management and community gardening initiatives in Qwaqwa. Watch [here](#).

Prof Shogo Kudo (Fellow) co-developed a trans-local sustainability partnership between Gojome, Japan, and Qwaqwa, South Africa, focused on mountain-based transformation and mutual learning.

Photo: Shogo Kudo

A transdisciplinary partnership is linking the mountainous communities of Qwaqwa and Gojome, Japan, through a trans-local sustainability collaboration by Prof Shogo Kudo (Akita International University) and Dr Melissa Hansen (ARU/Department of Geography). Rooted in shared challenges such as rural depopulation and economic

resilience, the initiative supports mutual learning through joint field schools, student exchanges, and community-engaged research. Embedded within the ARU's mission for mountain-based transformation, the partnership explores migration, entrepreneurship, and inclusive knowledge systems. For the Qwaqwa-Japan partnership, Prof

Kudo and Dr Hansen have drafted an article for the SAMC 2025 special issue of *Transactions of the Royal Society of South Africa*. Much of the Qwaqwa work was intellectually supported by Dr Michelle Brear (former postdoc in Education), who has also done extensive participatory research in Eswatini and other rural areas.

Estimating populations for better mountain management



Because of the large, peri-urban sprawling population of Qwaqwa, mostly outside of a formal town planning scheme, estimates on the actual population size vary tremendously. A project on population estimation in the Qwaqwa region is being carried out by the Global Mountain Safeguard Research Programme (GLOMOS) and the ARU-UFS. This initiative focuses on the cost-effective estimation of demographic data to improve water management and to support climate change adaptation efforts in this mountainous region (special edition of the Southern African Mountain Conference – SAMC).



The PhuthaPop Project research team: (from the left) Sakhile Radebe, Zinhle Mbongo, Jess Delves (Global Mountain Safeguard Programme – GLOMOS), Prof Melissa Hansen (ARU/Geography), Pulane Pudumo, Bongwiwe Mosikili, and Gift Hadebe.

Photo: Melissa Hansen

OneHealth: Rodent-borne disease surveillance in montane communities – ORATSA node



The ORATSA team on the Qwaqwa Campus – including Prof Steven Belmain (Natural Resources Institute; centre), Dr Hayley Thompson (Natural Resources Institute; centre right), and Prof Lourens Swanepoel (University of Venda).

Photo: ARU



A collaborative research project funded by the South African and UK Medical Research Councils is underway in South African townships to address rodent infestations and its impact on human and environmental health.

Led by Prof Peter Taylor, the initiative involves experts from the UK's Natural Resources Institute (Prof Steven Belmain and Dr Hayley Thompson) and South African partners from the UFS and the

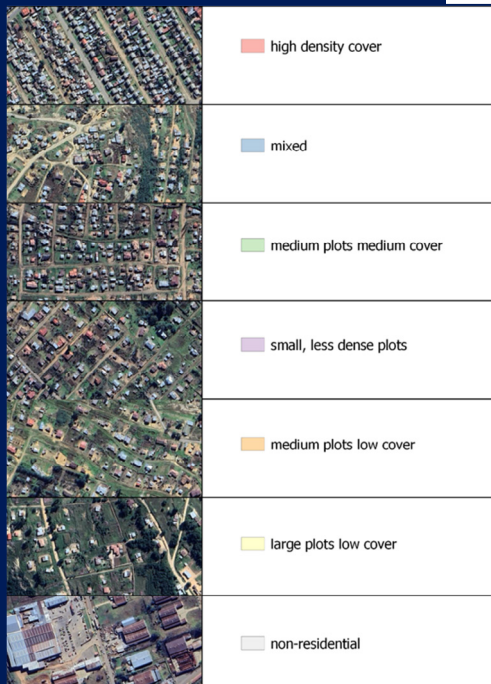
University of Venda. Fieldwork is centred on Phuthaditjhaba (near the Qwaqwa Campus) and Lwamondo in Limpopo.

The project integrates advanced techniques, including high-performance liquid chromatography (HPLC), mass spectrometry, molecular virology, microbiology, genome sequencing, and parasitology. Social scientists, such as Dr Shingirayi Chamisa (ARU/ Industrial Psychology), contribute insights into community perceptions

and mental health impacts related to rodent control.

Humane alternatives to rodenticides, such as contraceptive baits, are being trialled, offering ecologically sound solutions to reduce food contamination and disease transmission. This 'One Health' approach acknowledges the interconnectedness of human, animal, and environmental well-being.

 Access the article: [New research bites back at rodent problem in townships.](#)



A shared project on population estimation in the Qwaqwa region, carried out with the Global Mountain Safeguard Research Programme (GLOMOS), focuses on cost-effective demographic data to support water management and climate change adaptation in this mountainous area.

Photos: Stefan Schneiderbauer

Looking at the ARU's work through a psychosocial lens

Dr Shingirayi Chamisa (ARU/ Industrial Psychology) brings a psychosocial perspective to the ARU's transdisciplinary work. Her research focuses on employee wellness, youth empowerment, and inclusive development – critical themes for mountain communities grappling with structural inequality. Her co-authored studies on organisational citizenship, gender dynamics, and youth policymaking highlight a strong commitment to transformation and resilience in rural contexts. Through this work, Dr Chamisa contributes to the ARU's mission of linking human capital development with sustainable mountain livelihoods.



Find supporting information about Dr Chamisa [here](#).



Dr Shingirayi Chamisa brings a psychosocial lens to mountain research – connecting wellness, empowerment, and inclusive development in rural highland communities. Photo: Supplied

Mountain bat ecology and ecosystem services platform advancing pest control, climate resilience, and alpine biodiversity



Dr Veli Mdluli (former doctoral student) from the Mountain Bat Lab presenting his research on the effects of climate change and human disturbance on bat communities in grassy mountain systems.

Photo: Alexandra Howard

Led by Prof Peter Taylor, the Mountain Bat Laboratory (MBL) investigates bat diversity, ecosystem services, and climate resilience in montane landscapes. A recent [book chapter](#) highlights how Prof Taylor and collaborators quantify the financial benefits of bat-mediated pest control in macadamia orchards; showing that bats save farmers around USD2 600 per hectare annually through reduced crop damage.

Bat activity and predation pressure increase in orchards near natural vegetation, highlighting the importance of semi-natural habitats for sustaining bat-mediated pest control services in agricultural landscapes. Similarly, the MBL

explores bat pest control in apple orchards using acoustic monitoring and molecular barcoding, as well as important work on bats as ecological indicators of climate and land-use change along elevational gradients in and around Phuthaditjhaba. An important breakthrough – and a first in South Africa – has been to better understand how bat communication differs between seasons, roosts, and foraging sites, as part of the social repertoire of dominant bat species in these agricultural landscapes. Bat box occupancy is an important practical topic of the MBL to encourage local bat populations and their economic benefits. From a mountain biogeography perspective, the MBL has researched deep-time climate-driven diversification of bats along

Southern Africa's Great Escarpment, showing a close relationship between species along the arid western and moist eastern escarpment. The MBL contributes to regional conservation through IUCN RedList assessments.

Find supporting information and an article here about the mountain bat research:

 [Southern Africa's Great Escarpment as an amphitheater of climate-driven diversification and a buffer against future climate change in bats.](#)

 [UFS biologists discover new tiny, white-thumbed bat species from Eswatini.](#)



Prof Peter Taylor (ARU/Zoology and Entomology; left) conducting Mountain Bat Lab fieldwork as part of the Witsieshoek BioBlitz.
Photo: Alexandra Howard



Dr Veli Mdluli and Alexandra Howard conducting mountain fieldwork, advancing biodiversity research in South Africa's montane landscapes.

Photo: Alexandra Howard

Advancing mountain ecology through protea pollination and unexpected vertebrate partners



Thulile Buthelezi (Plant Sciences) is taking repeat photographs of the endemic cushion plant *Euphorbia clavarioides* to document its flowering phenology over the course of the year, as part of her MSc project.

Photo: Sandy-Lynn Steenhuisen

Prof Sandy-Lynn Steenhuisen's research portfolio includes several distinct contributions to alpine ecology and pollination science. One example, *Evidence for beetle pollination in the African grassland sugarbushes*, explores transitions from bird to beetle pollination in the common protea *Protea afra* (previously *P. caffra*), the Drakensberg sugarbush *P. dracomontana*, the dwarf grassveld sugarbush *P. simplex*, and the dwarf savanna sugarbush *P. welwitschii*, and even small mammal pollination in several ground-flowering *Protea* species in the Cape

Floristic Region biodiversity hotspot, with her research focusing on floral trait evolution, scent profiles, nectar chemistry, and flower positioning.

This work is now expanding into an investigation of the role of nectar microbes in the pollination of these proteas. The project assesses how fermentation of nectar by microbes may alter the flower's attractiveness to pollinators, and in turn affect protea evolution. This project commenced with a DHET FPP-funded 2025 alpine field trip with Prof Steenhuisen, Dr Arun Gokul (UFS Department of Plant Sciences), Tapiwanashe

Mashamba, Prof Robert Raguso (Cornell University), Dr Adriaan Engelbrecht (UWC), and Prof Francois Roets (SU), and involves a continuing collaboration with Dr Nora Mitchell (University of Wisconsin-Eau Claire) to investigate phylogenetic patterns and pollination dynamics in *Protea* in montane landscapes, strengthening the ARU's international research footprint.

Another distinct contribution is Prof Steenhuisen's co-authored paper *Saurian Surprise: Lizards Pollinate South Africa's Enigmatic Hidden Flower*, with Ruth J Cozien



Thulile Buthelezi (Plant Sciences) conducting hand pollination experiments on *Euphorbia clavarioides*.
Photo: Sandy-Lynn Steenhuisen



Prof Sandy-Lynn Steenhuisen's (ARU/Plant Sciences; right) research in the mega-biodiverse Cape Floristic Region and along the eastern Great Escarpment explores how beetles, small mammals, and nectar microbes shape protea pollination and evolution in montane landscapes.
Photo: Sandy-Lynn Steenhuisen

(postdoctoral fellow, Centre for Functional Biodiversity, University of KwaZulu-Natal, and project lead), Timotheüs van der Niet (UKZN), and Steven D Johnson (UKZN). This study revealed the Drakensberg crag lizard *Pseudocordylus subviridis* as a key alpine pollinator and the first record of lizard pollination on continental Africa, challenging long-

held assumptions about vertebrate pollination systems in South Africa's mountain environments.

Other studies are cushion plant pollination (with Prof Dave Thompson, SAEON), analysis of pollination networks along elevation gradients, and berg lily *Galtonia* pollination and genetics (with Prof Glynis Cron,

University of the Witwatersrand), and drought impact on pollination – the latter collaboration with Dr Michelle Tedder (UKZN), together with Prof Martin and Dr Arun Gokul (Plant Sciences), has led to the start of a long-term drought impact study on montane grasslands as part of the global Drought-Net project.



(Above left and right) Prof Sandy-Lynn Steenhuisen (ARU/Plant Sciences; above left) and Dr Ruth Cozien (University of KwaZulu-Natal; above right) discovered the first example of a lizard pollination system on mainland Africa – at Witsieshoek close to the Qwaqwa Campus.
Photos: Leonie Bolleurs

Researching carbon-hydropedology interactions in montane grasslands



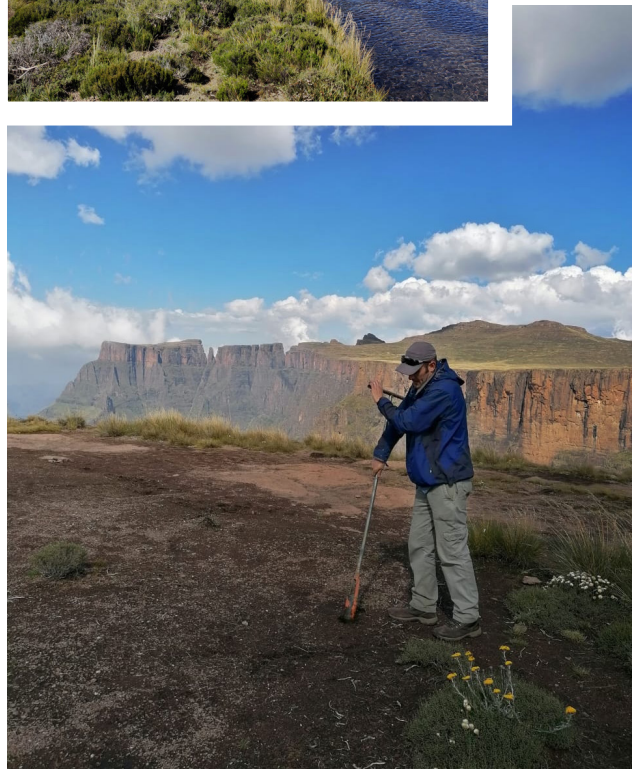
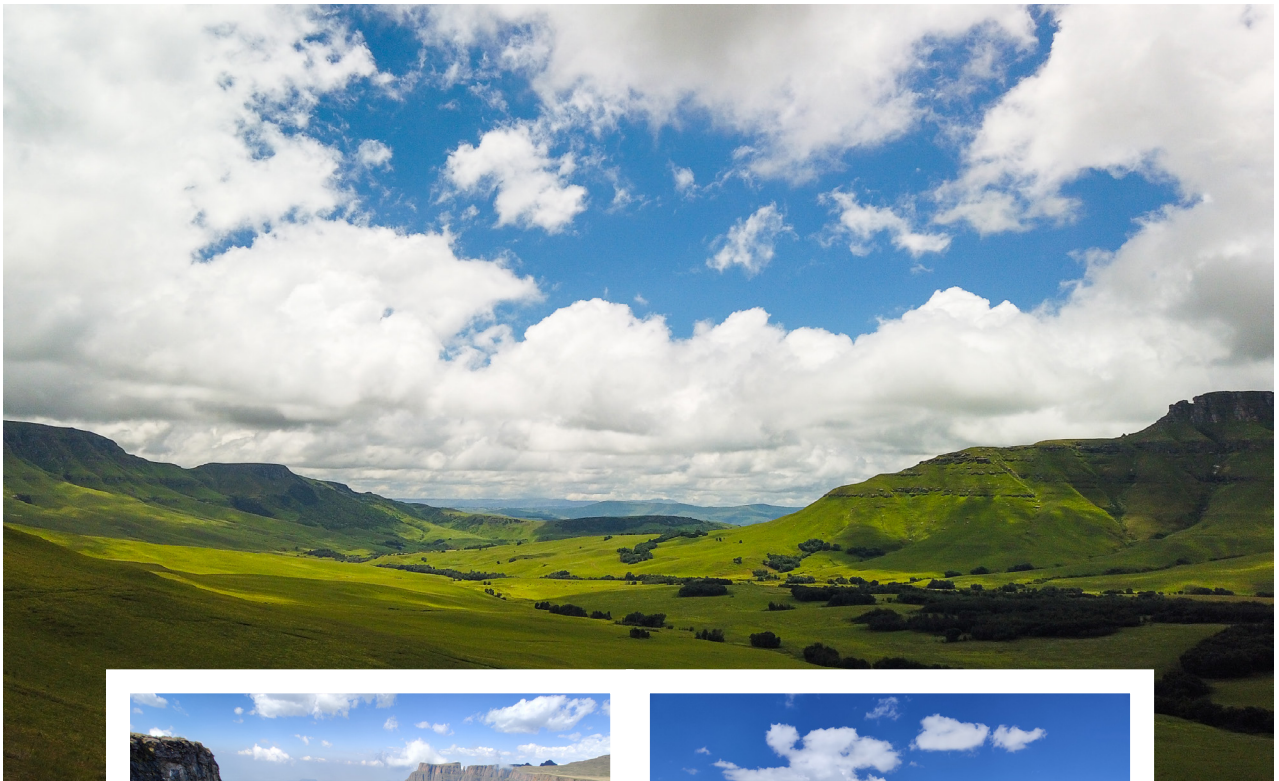
Montane landscape under study – where carbon hotspots and hydro-pedological patterns reveal the terrain's role in ecosystem resilience and the potential for restoration.

Photo: Jaco Kotzé

Prof Johan van Tol is engaged in a range of hydropedology projects that explore how soil properties influence water movement and carbon storage in mountain ecosystems. One study used digital soil mapping (DSM) to map soil organic carbon stocks (SOCs) in the uThukela catchment and modelled patterns across the Maloti-Drakensberg, confirming carbon hotspots shaped by terrain variability and cautioned against the use of generalised national models for the region where

soil observations are largely absent. Other work includes research in Monontsha village, where biochar-enhanced sanitation strategies were tested to reduce pollution and promote safe sludge reuse, and a study on wetland degradation in the northern Maloti-Drakensberg from Lestseng to the amphitheatre summit, which showed that terrain, not only grazing or climate, is a key driver of ecosystem change. Other studies in the Sehlabathebe National Park (Lesotho) and Cathedral Peak

research catchments focused on wetland characterisation, including hydroperiods and dissolved organic carbon exports from these systems. These examples form part of broader research that supports the ARU's Mont-aux-Sources LTSER site and informs restoration efforts across the RangeX, NatuRA, and GMBA platforms, while also contributing to policy discussions through a recent book chapter and an upcoming SAMC 2025 special session.



Jaco Kotzé (Soil, Crop and Climate Sciences) during fieldwork in the northern Maloti-Drakensberg.
Photo: Jaco Kotzé

Prof Johan van Tol (ARU/Soil, Crop and Climate Sciences) uses digital soil mapping (DSM) to map soil organic carbon stocks – here working in the alpine catchment of the Amphitheatre, which feeds the tallest waterfall in the world: uThukela (Tugela) Falls.
Photo: Jaco Kotzé

The ARU's Mountain Antelope Programme elevates high-altitude conservation



Rugged grassland slopes of the Maloti-Drakensberg – critical habitat for mountain antelope and the focus of long-term conservation research.

Photo: Sven Musica – Love Africa Marketing

The ARU's Mountain Antelope Programme is advancing conservation science in South Africa's high-altitude grasslands. Focused on two iconic species, the mountain reedbuck, *Redunca fulvorufula*, and the Cape eland, *Taurotragus oryx*, the programme integrates population monitoring, habitat use, and rangeland dynamics. Based at the Golden Gate Highlands National Park and the Clarens Conservancy, research on endangered mountain reedbuck combines ecological data with community insights to help untangle the multiple causes of precipitous declines in this species, aiming to co-opt all stakeholders to safeguard the future of this iconic mountain antelope.

Cape eland studies, led by Prof Peter Taylor and guided by Profs Grant Martin, Sandy-Lynn Steenhuisen, and Ralph Clark, span protected and communal lands in the northern Maloti-Drakensberg, including the Northern Drakensberg Nature Reserve, Royal Natal, and Golden Gate Highlands National Parks, and Qwaqwa. The team recently secured R1,8 million in funding from the Hans Hoheisen Charitable Trust to support these antelope studies, as well as a related rangeland restoration and rewilding project. Part of this funding will go towards GPS collars to be fitted to eland in the Golden Gate Highlands National Park, Royal Natal National Park, or both.

These projects support the ARU's transdisciplinary platforms on climate resilience, One Health, and land-use planning, with partners including SANParks, Ezemvelo KZN Wildlife, and local custodians.



(Top and bottom) Community participatory research with Thaba Tshweu residents, mapping with master's student Thembelihle Mofokeng (Zoology and Entomology; top, at left) and facilitator Ntate Sechaba Motsumi (Bakoena Royal Council; bottom in centre) on endangered mountain reedbucks in the Golden Gate Highlands National Park.

Photos: ARU

Jackal ecology in the Afromontane landscape



Prof Aliza le Roux leads pioneering research on black-backed jackals (*Canis mesomelas*). Her work explores how these adaptable mesopredators navigate human-dominated and protected landscapes in South Africa's montane grasslands. Through live-trapping, GPS tracking, and stable isotope analysis, Prof Le Roux and her collaborators have revealed behavioural plasticity, dietary flexibility, and spatial responses to environmental pressures, including moon phase, seasonal cycles, and land use type. These studies,

conducted in areas such as the Golden Gate Highlands National Park and surrounding farmland, inform predator management and conservation strategies under the ARU's broader mission to understand mountain-based social-ecological systems. Her research also contributes to the ARU's Mont-aux-Sources LTSER site and supports transdisciplinary platforms focused on One Health, biodiversity resilience, and human-wildlife coexistence in alpine regions.

Montane grassland habitat in Golden Gate Highlands National Park – where black-backed jackals adapt to seasonal cycles and human pressures.

Photo: Aliza le Roux

Mountain roadkill peaks signal need for wildlife-conscious infrastructure planning



As road networks expand into Africa's mountainous regions, wildlife faces increased risks from vehicle collisions. Prof Aliza le Roux, Dr Katleho Mashiane, and Prof Clara Grilo from the Rede de Investigação em Biodiversidade e Biologia Evolutiva synthesised data from 26 African roadkill surveys, analysing 5 549 records across amphibians, reptiles, birds, and mammals. Using elevation and ruggedness data from Google Earth Engine, researchers found that roadkill rates peaked in mid-elevation mountains, while high-

elevation areas had the lowest rates, but the highest proportion of vulnerable species killed. Their findings suggest that while rugged terrain may reduce collision frequency, it disproportionately impacts threatened species. The study underscores the urgent need for wildlife-conscious infrastructure planning to balance development with biodiversity conservation in Africa's ecologically sensitive montane regions. The team is currently expanding the pilot study to include roadkill data from across the globe.

Winding mountain roads through rugged terrain – where infrastructure expansion intersects with wildlife vulnerability.

Photo: Supplied

Dr Emile Bredenhand's focus on insects, indicators, and alpine ecosystems



Dr Emile Bredenhand's (ARU/Zoology and Entomology) work on invertebrates blends quantitative ecology with applied conservation.
Photos: Emile Bredenhand

Dr Emile Bredenhand, Senior Lecturer in Zoology and Entomology on the UFS Qwaqwa Campus, plays a vital role in the ARU's mission to understand mountain ecosystems through the lens of entomology. His research focuses on using insects, especially soil-dwelling arthropods and macroinvertebrates, as bioindicators of ecosystem health across grassland, wetland, and alpine habitats. From mapping erosion risk using arthropod diversity to

assessing the ecotoxic effects of sludge and biochar, Dr Bredenhand's work blends quantitative ecology with applied conservation.

His studies contribute to the ARU's Mont-aux-Sources LTSER site and support sustainable land-use planning in the Maloti-Drakensberg. He is also mentoring students in ecosystem assessment and species identification, helping to build regional capacity in mountain entomology.

Access supporting documentation on the work of Dr Emile Bredenhand.



[Emile Bredenhand - Google Scholar.](#)



[Evaluation of macro-invertebrates as bio-indicators of water quality and the assessment of the impact of the Klein Plaas dam on the Eerste River.](#)

Tracing climate change impacts from the Southern Ocean to the Maloti-Drakensberg



Dr Liezel Rudolph (formerly ARU/Geography, now a Fellow) has done work on Gough Island in the South Atlantic Ocean, where she has been involved in research that aims to better understand the landscape evolution of some subantarctic islands and their response to long-term climate change.

Photo: Liezel Rudolph

Dr Elizabeth Rudolph (ARU/Department of Geography) contributes to Southern Ocean Island research through her work on geomorphology – including glacial and periglacial; landscape analysis and visualisation; and dating techniques in earth-surface processes and denudation rates.

One example of her research includes the development of a high-resolution geospatial database for the Prince Edward Islands (South Africa), enabling improved analysis of fine-scale biotic-abiotic interactions of the Islands' landscape and ecosystems within the context of climate change and the impact of invasive species. In a separate study on Marion Island, she co-developed a geo-rectified

spatial database and map of glacial landforms using GPS and satellite imagery, providing a foundation for future modelling of post-glacial landscape evolution and ecological recovery since the Quaternary.

Separately, Dr Jay le Roux (ARU/UFS Department of Geography) has gained experience in mapping periglacial and mass-wasting landforms in South Africa, Marion Island, and the (sub-)Antarctic, using these features as diagnostic indicators of climatic conditions. His current research focuses on soil erosion and sediment yield mapping/modelling in a changing environment using GIS applications at regional/catchment scales. Most recently, he developed a national input database

to run the SWAT model in South Africa – made available as an 'open-source' baseline in 'cloud storage', published in the *Journal of Hydrology*.

Although not focused on the Antarctic region, Dr Adriaan van der Walt's (ARU/UFS Department of Geography) research on extreme temperature events and heatwave dynamics in the Maloti-Drakensberg also contributes valuable insights to the ARU's broader climate change investigations, particularly in understanding ecological vulnerability and resilience in high-altitude environments.



Access the article that was published in *The Citizen: Study of sub-Antarctic islands sheds more light on climate change*.

Linking soil health and social systems for sustainable futures in mountain regions



Land-use variation and associated degradation along the Maloti-Drakensberg foothills in KwaZulu-Natal.
Photo: Linus Franke

Prof Linus Franke and Dr Neo Mathinye (ARU/ Department of Soil, Crop, and Climate Sciences) are key contributors to transdisciplinary work on community resilience in mountain regions. Both collaborate on research linking land degradation, soil health, and sustainable livelihoods. Their work supports the ARU's Mont-aux-Sources LTSER platform, where soil erosion, agricultural vulnerability, and climate adaptation intersect with

community well-being. By integrating biophysical data with social context, their research informs land-use planning and ecological restoration in the Maloti-Drakensberg. Dr Mathinye's contributions to the ARU's *Mountain Research and Development* publication further reinforce the unit's systems-based approach to resilience. Their joint studies in *Frontiers in Sustainable Food Systems, Social Sciences & Humanities Open* and *Springer's*

Human-Nature Interactions offer grounded insights into the possible development pathways and aspirations of people living in the rural communities of the northern Drakensberg.



Access the article, Soil Erosion Research and Soil Conservation Policy in South Africa, [here](#).



Participatory farm mapping is used to assess socio-economic patterns in traditional authority areas in the Maloti-Drakensberg.

Photo: Linus Franke

Prof Grey Magaiza's focus on entrepreneurship in the mountains



The ARU has grown a strong focus on social entrepreneurship, livelihoods, youth development, and indigenous knowledge systems in mountain regions. Prof Grey Magaiza's (ARU/Community Development) work supports inclusive development in mountain communities – linking entrepreneurship to climate resilience and indigenous knowledge.

Photo: Sonia Small

Led by Prof Grey Magaiza (ARU/Community Development/Centre for Gender and Africa Studies), the ARU has grown a strong focus on social entrepreneurship, livelihoods, youth development, and indigenous knowledge systems in mountain regions. Collaborating with scholars from the Walter Sisulu University and the UFS, he investigates climate adaptation, livelihood resilience in the Afromontane, community development in sub-Saharan Africa, and curriculum innovation, among others.

One example is his co-authored paper with Dr Shadreck Muchaku from the UFS Centre for Gender and Africa Studies, *Factors*

Determining the Ability of Rural-Based Universities to Nurture Positive Entrepreneurial Behaviour, which identifies key barriers to student entrepreneurship, such as outdated curricula and limited infrastructure. The study proposes strategic criteria for strengthening entrepreneurial education in rural universities. Prof Magaiza's work links local livelihoods to broader sustainability goals, exploring how the ARU's mountain science remains rooted in community realities and policy relevance. His research continues to shape inclusive development pathways across the Maloti-Drakensberg.

Access supporting information on the work of Prof Grey Magaiza.



Factors determining the ability of rural-based universities to nurture positive entrepreneurial behaviour among university students
[International Journal of Entrepreneurial Knowledge](#)



[Grey Magaiza, Google Scholar](#)

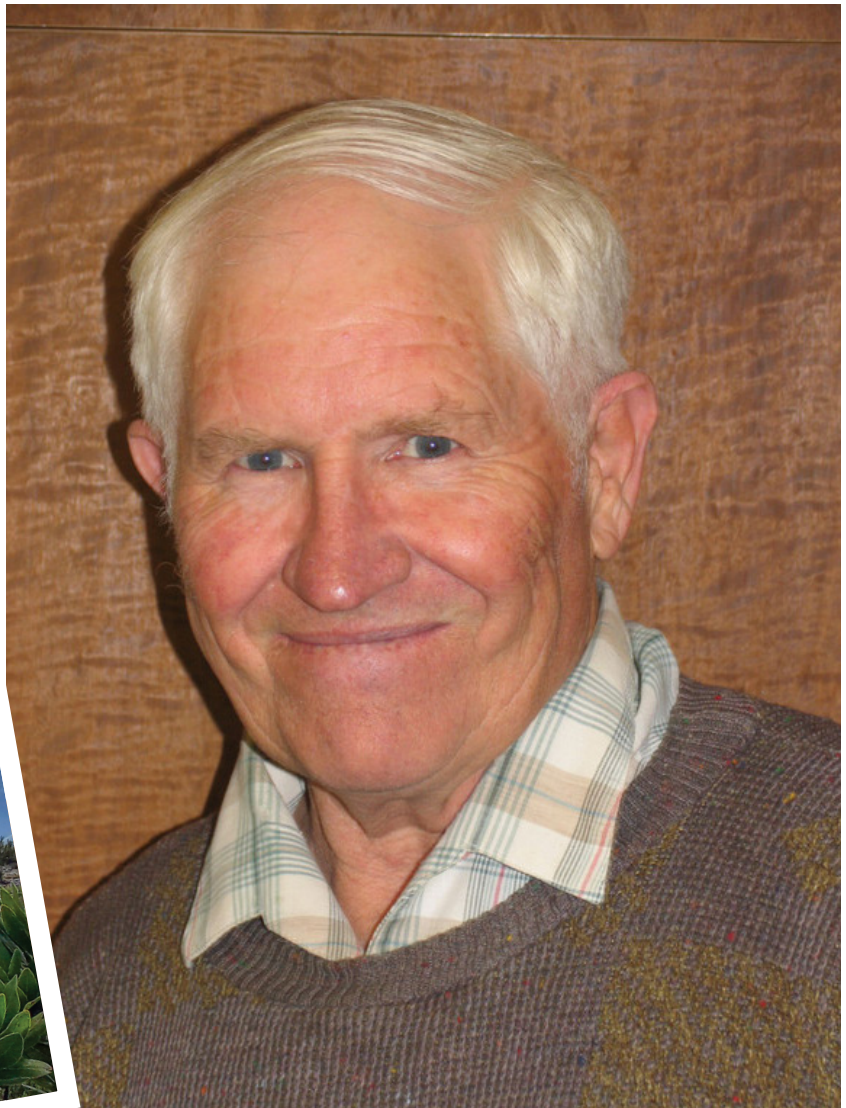
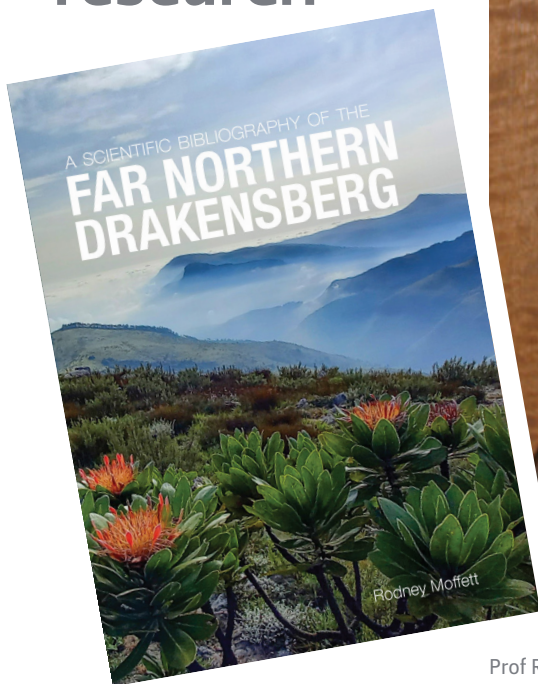


The Afromontane Research Unit: Driving connections and capacity building for the sustainable development of southern African mountains
[Driving connections and capacity building for the sustainable development of southern African mountains on JSTOR](#)



SHARING MOUNTAIN KNOWLEDGE

Prof Rodney Moffett's bibliographic legacy in mountain research



Prof Rodney Moffett's (Fellow) bibliographic volumes and ethnobotanical works form a cornerstone of African mountain scholarship – preserving knowledge across landscapes, languages, and disciplines.

Photo: Rodney Moffett


Prof Rodney Moffett, Honorary Research Fellow in the UFS Department of Plant Sciences and ARU Associate, has made a landmark contribution to African mountain research through his *Mountain Research Bibliography Series*, published under the auspices of the ARU. His first volume, *A Scientific Bibliography of the Drakensberg, Maloti and Adjacent Lowlands* (2020), catalogues more than 10 000 entries spanning disciplines from palaeobotany to rock art. The second, *A Scientific Bibliography of the Far Northern Drakensberg* (2023), expands

coverage to the Limpopo, Mpumalanga, and Eswatini Escarpment, building on the geographic and thematic scope of the series, and the third, *A Scientific Bibliography of the Waterberg, Makgabeng Plateau, Blouberg and Soutpansberg* (2025) covers the remaining mountain areas of the Limpopo province.

Other books by Prof Moffett since his retirement in 1999 include *Sesotho Plant and Animal Names and their uses by the Basotho* (2010); *A Biographical Dictionary of Contributors to the Natural History*

of the Free State and Lesotho (2014); and *Meriana Ya Dimela Tsa Basotho / Basotho Medicinal Plants* (2020).

His publications reinforce the ARU's mission to build a transdisciplinary mountain research community rooted in African contexts, and his efforts were rewarded by receiving the Silver Medal from the South African Association of Botanists in 2023 and a Gold Medal from the Heritage Association of South Africa in 2024.

 Access supporting information about Prof Rodney Moffett's work, [here](#).



The Summits of Africa documentary showcases the Maloti–Drakensberg’s role in mountain stewardship

The *Summits of Africa: South Africa and Lesotho – The Drakensberg* is a visually compelling documentary in German and French that explores the cultural, ecological, and scientific richness of the Maloti–Drakensberg. Featuring members of the ARU team alongside local

voices and international experts, the film highlights the region’s transboundary significance and the urgent need for sustainable mountain stewardship. Through breathtaking visuals and grounded storytelling, the documentary reinforces the ARU’s mission to elevate African mountain

science and foster inclusive dialogue across borders. An English version is forthcoming, expanding its reach to global audiences.



Watch the video: *The Summits of Africa: South Africa and Lesotho—The Drakensberg*.

A mountain story unfolds in the documentary, *Qwaqwa: Place of Barriers and Bridges*

Premiered at SAMC2025, *Qwaqwa: Place of Barriers and Bridges* is a powerful documentary exploring the cultural and ecological heartbeat of the Qwaqwa region. Produced and directed by Prof Vasu Reddy (Deputy Vice-Chancellor: Research, Innovation and Postgraduate Studies) and Prof Jared McDonald (Assistant Dean: The Humanities, Qwaqwa Campus), the film highlights the deep relationship between mountain communities and their environment. It addresses pressing issues such as climate change and governance challenges, while showcasing the region's potential for inclusive development. The documentary supports the value of asset-based community approaches and aligns closely with the ARU's mission of mountain-based transformation.



Watch this video: *Qwaqwa: Place of Barriers and Bridges* – a mountain story of resilience, heritage, and the pursuit of inclusive development.

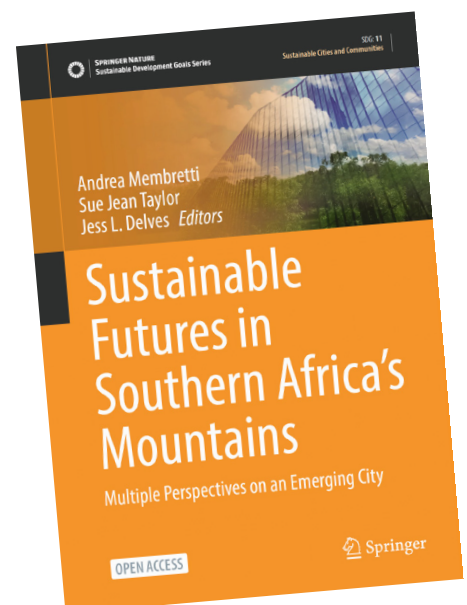


Flagship ARU publication explores sustainable futures in Phuthaditjhaba

One of the major book contributions by ARU-affiliated researchers is the book *Sustainable Futures in Southern Africa's Mountains: Multiple Perspectives on an Emerging City*, edited by Prof Andrea Membretti (then ARU fellow/Sociology, UFS), Dr Sue Jean Taylor (then ARU fellow/Geography, UFS), and Jess Delves (GLOMOS). Published in early 2023, the book explores Phuthaditjhaba as a case study of mountain urbanisation, framed through the lens of the UN Sustainable Development Goals. It brings together diverse

disciplinary insights on infrastructure, biodiversity, water access, and social resilience. As a flagship open-access publication, it exemplifies the ARU's commitment to transdisciplinary research, regional relevance, and global visibility. The book anchors the ARU's intellectual identity and policy engagement in African mountain systems.

The cover of *Sustainable Futures in Southern Africa's Mountains* – a flagship ARU publication exploring Phuthaditjhaba's urban transformation through diverse mountain research perspectives.



ARU Mountain Library; a growing legacy of knowledge



Prof Ralph Clark (ARU Director) in the ARU Mountain Library on the UFS Qwaqwa Campus. The Martin Price Collection is the core of the library, with a growing legacy of global mountain scholarship.

Photo: Sonia Small

Housed within the ARU Building on the UFS Qwaqwa Campus, the ARU Mountain Library offers an exceptional collection of international mountain literature, fostering scholarly engagement and transdisciplinary research. The main content of this resource is the personal library of Prof Martin Price – a founding member of the ARU Advisory Board – donated to the ARU in 2020 upon his retirement, and containing works from mountains around the world across all disciplines. Complemented by virtual conferencing facilities and a welcoming communal space, the library reflects the ARU’s commitment to accessible, African-rooted scholarship.



Chris Willis (Chief Director: National Botanical Gardens, SANBI; right) facilitated the donation of SANBI books to the ARU Mountain Library. They were received on behalf of the ARU by the former Qwaqwa Campus Principal, Dr Martin Mandew (left).

Photo: ARU and SANBI



APPRECIATING EXPERIENCE

A decade of administrative excellence at the ARU – building a resilient support system that enables collaboration, research, and inclusive growth across the continent.

Photo: Supplied

Ten years of administrative excellence at the ARU

Over the past decade, the ARU has built a resilient and high-performing administrative team from the ground up. From its early foundations, the unit has grown through two cycles of capacity development, transforming junior-level appointments into competent support staff. Lethiwe Sokhela was the founding Assistant Officer in the ARU, growing from here through dedicated project management contracts – such as administrative lead on the UK-SA University Staff Doctoral Programme – into the lead agent for the Centre for Graduate Support on the Qwaqwa Campus. Sithando Jwara has grown from Assistant Officer in the ARU to Senior Assistant Officer, now also mentoring younger staff and interns – such as intern Ntsiki Mthombeni. Contract support was provided by Pulane Xaba in the USA-SA University Staff Doctoral Programme, while Bianca Baloyi and Noxolo Phungula provided administrative support for the Risk and Vulnerability Science Programme – Noxolo has now moved on with the spin-off Centre for Global Change and is continuing to provide excellence. Their work has enabled the seamless hosting of academic visitors, international collaborations, and high-volume workflow within the UFS systems. Albert Malefane was our excellent ARU Student Assistant from 2018 to 2020 and is now a very successful schoolteacher and competitive cyclist. Their dedication has shaped the ARU into a well-functioning, inclusive space that supports researchers, students, and partners across the continent.



Pulane Xaba (left) and Lethiwe Sokhela (right) at the top of the chain ladders at Witsieshoek. Pulane provided administrative support to the US-SA University Staff Doctoral Programme (USDP), and Lethiwe was the founding administrator of the ARU and later provided dedicated administrative support to the UK-SA USDP and Mountain-to-Mountain Programme.

Photo: Ralph Clark



Noxolo Phungula provided administrative support for the Risk and Vulnerability Science Programme which became the Centre for Global Change.

Photo: Centre for Global Change



Albert Malefane was the first ARU Student Assistant, helping with a wide variety of projects and tasks.

Photo: Albert Malefane



Sithando Jwara has become one of the most efficient and proficient administrators on the Qwaqwa Campus, providing excellent support for a wide variety of logistically and financially complex field projects and daily ARU functioning.

Photo: ARU

ARU strengthens executive governance across UFS structures

Formally, the ARU reports within the UFS to the UFS Deputy Vice-Chancellor: Research, Innovation and Postgraduate Studies – currently Prof Vasu Reddy – and the UFS Qwaqwa Campus Principalship, with courtesy reporting and input to and from a wide range of other internal UFS stakeholders, in keeping with its decentralised, multidisciplinary mandate representing mountains across the UFS and as the flagship research group of the Qwaqwa Campus. The ARU serves on the Qwaqwa Campus Management Committee and the Qwaqwa Research and Management Funding Committee.

Strategic governance through the ARU Advisory Board

Since its inception in 2016, the ARU Advisory Board has played an important role in shaping the unit's strategic direction and governance. Across three compositions (2016-2018, 2019-2021, and 2022-2024), the board has provided high-quality, non-executive input rooted in internationalisation, disciplinary breadth, geographic diversity, and engaged scholarship. The board is chaired by the UFS Deputy Vice-Chancellor: Research, Innovation and Postgraduate Studies – first Prof Corli Witthuhn and then Prof Vasu Reddy – and comprises invited world-leaders

in mountain research and global mountain networks – such as Profs Courtney Flint, Martin Price, Susanna Venn, Billy Schumann, and Stefan Grab, and Drs Reeto Sogani, Gregory Greenwood, and Carolina Adler – together with local management and policy expertise, such as Johan Pauw and Leluma Matookane. Notably, the Batlokoa and Bakoena Royal Councils' active input has deepened local engagement. The board's collective expertise continues to strengthen the ARU's governance, positioning it as a globally connected, locally grounded hub for mountain research and transformation.

ARU Committee shaped early grant strategy

Between 2015 and 2019, an ARU Committee – chaired by the Senior Director: Research Development, Dr Glen Taylor – facilitated the review and approval of internal ARU Grant Programme awards as part of the initial development of the ARU. The committee was disbanded in 2020 as part of a strategic decision to replace the ARU Grant Programme with a strategic focus on landing external research grants, which has been very successful, and to streamline internal budgets and processes.



UFS leaders, Prof Vasu Reddy (UFS Deputy Vice-Chancellor: Research, Innovation and Postgraduate Studies; centre left) and Prof Anthea Rhoda (then acting UFS Vice-Chancellor and Principal; centre right) at the July 2024 NSTF Awards, where Prof Sandy-Lynn Steenhuisen (ARU/Plant Sciences; left) and Prof Peter Taylor (ARU/Zoology and Entomology; right) were finalists in the Green Economy category.
Photo: Supplied

Celebrating excellence: A decade of academic impact

The ARU's first decade was marked by a deep commitment to academic excellence and capacity development. To boost mountain research capacity at the UFS and in the Southern African region, the ARU has heavily invested in early career capacity development through different forums and platforms. Two of the largest financial investments were two University Staff Doctoral Programmes (USDP) – one with three US partners (Appalachian State University, Montana State University, Colorado), led by Prof Geoffrey Mukwada (ARU/Geography) – and one with the University of the Highlands and Islands (United Kingdom), led by Prof Grey Magaiza, the first staff graduate of the US-SA USDP. Both USDPs were in local collaboration with the University of Venda and were financially supported by the South African Department of Higher Education and Training.

The British Council also supported the UK-SA USDP, with in-kind and additional financial support from all institutional partners. The USDPs together supported 17 academic staff at the UFS and the University of Venda to achieve doctoral qualifications.

Supplementing this effort, the Mountain-to-Mountain programme (funded by the US Embassy) supported the mentoring of female academic staff on the Qwaqwa Campus. The SAMC series has also invested in extensive capacity building for emerging career academics, covering grant writing, peer-reviewed journal publication, and networking. The ARU, with NRF support, also hosted internal writing workshops, which were complemented by in-department capacity development activities at the UFS.

Such support has contributed to

multiple staff promotions and NRF ratings on the UFS Qwaqwa Campus, with 10% of ARU research champions now rated as well established, and 45% as established. The remaining 45% – early career and emerging scholars – benefit from the ARU's mentoring and financial support. In May 2024, the ARU Director was awarded an NRF C1 rating, reflecting national recognition of scholarly leadership. The unit also attracted Prof Peter Taylor, a B-rated South African Research Chair Initiative-level academic, significantly strengthening the Department of Zoology and Entomology. In July 2024, Profs Steenhuisen and Taylor were named finalists in the prestigious NSTF-South32 Awards, affirming the ARU's role in cultivating nationally celebrated research excellence. The ARU has supported three ARU champions to apply for research chairs.



ARU ON THE AFRICAN AND GLOBAL STAGE

In 2019, the ARU became part of the Mountain Invasion Research Network (MIREN) and participated in a workshop in Switzerland that led to the EU Biodiversa 'RangeX' project.

Photo: MIREN



The Global Observation Research Initiative in Alpine Environments (GLORIA) programme celebrated 25 years at the International Mountain Conference in 2025. The ARU participated in the event and intends establishing a GLORIA site in the Maloti-Drakensberg in the summer of 2026/2027.

Photo: GLORIA

In its first decade, the ARU has laid a strong foundation for continental and global impact. While early outputs focused on Southern Africa, the unit now contributes meaningfully to global mountain research from an African perspective. With growing involvement in international consortia, strategic partnerships across Africa, and high-profile publications underway, the ARU is poised to expand its reach. From editorials to collaborative datasets, its voice is increasingly shaping both African scholarship and global mountain research agendas.

The ARU is actively involved in most key international mountain networks and protocols. The ARU is a proud associate of the Mountain Research Initiative (MRI) – with both successive MRI Executive Directors having served on the ARU Advisory Board, and the ARU actively contributing to the MRI's GEOMountains programme. The ARU has been a member of the International Mountain Society (IMS) since 2017, with the ARU Director serving on the IMS Board of Directors since 2020. The ARU is represented on the Global Mountain

Biodiversity Assessment (GMBA) Scientific Committee and hosts a GMBA Regional Hub. There is very active participation by the ARU in the Mountain Invasion Research Network (MIREN), with representation on the Steering Committee, and collaboration on key projects such as 'RangeX' and expanding the MIREN experiment protocol in Southern Africa. In austral summer 2025-2026, the ARU will finally be able to implement the Global Observation Research Initiative in Alpine Environments (GLORIA) protocol in the Mont-aux-Sources LTSER – filling a key regional data gap in this global data series. Over time, the ARU seeks to also become better connected with the Mountain Sentinels programme, which focuses on social-ecological long-term protocols and monitoring. The ARU has contributed African regional and continental perspectives to several global monitoring protocols and synthesis outputs on, e.g., biodiversity and social-ecological systems thinking.



Also read: [ARU extends mountain research across Africa](#)

ARU strengthens continental presence at the International Mountain Conferences



Celebrating collaboration between SAMC2025 and IMC2025. From the left are Prof Stefan Mayr (IMC President from the University of Innsbruck), Conor Eastment (SAEON and Utrecht University), Abusiswe Ndaba (University of Cape Town), Zandile Mncube (UFS), Sanele Mnkandla (UFS), Prof Ralph Clark (ARU Director and SAMC2025 Chair), Dr Wolfgang Gurgiser (IMC2025 Co-ordinator from the University of Innsbruck). Conor, Abusiswe, and Sanele were winners of the #IMC's PhD Mobility Grant awarded at SAMC2025 to attend IMC2025 in Austria.

Photo: #IMC2025



The ARU has proudly participated in the International Mountain Conference (IMC) series in Innsbruck, Austria – 2019, 2022, and now 2025 – bringing African mountain science into global focus. These conferences convene leading researchers to address global change, resilience, and interdisciplinary collaboration. Aligning the ARU-led SAMC series to feed into the IMC series has significantly increased African representation and contributions at IMC events – putting African perspectives and research much stronger on the global stage.

At IMC2025, the top three PhD students from SAMC2025 were sponsored by #IMC to attend the Summer School and conference event. The ARU Director, Prof Ralph

Clark, convened a focus session on African mountains: *Navigating Africa's Mountains in New Global Change Territory*, spotlighting the continent's unique, archipelago-like mountain systems and their rich biodiversity, cultures, and vulnerabilities. While African mountains remain underrepresented in global data initiatives, the ARU's presence has helped build visibility and support continental integration. Across IMC2019 and IMC2022, more than 1 400 researchers from 60+ nations participated. Among them, the ARU stood as a key advocate for stronger African co-operation and inclusion in global mountain research agendas, ensuring that Africa's peaks are not only seen, but heard.

Thanks to the Southern African

Mountain Conference's partnership with the International Mountain Conference (IMC2025), four Southern African early career researchers joined global peers in Innsbruck, Austria, in September 2025. Ecology PhD candidate Conor Eastment (SAEON) found that his microclimate research aligned with emerging global frontiers, while Sanele Mnkandla (UFS) presented on mycofiltration and explored fungal ecology labs for future collaboration. For Zandile Mncube (UFS), the experience marked her first international trip and deepened her appreciation for Africa's role in global mountain science. All three highlighted the value of SAMC in amplifying African voices and building lasting networks across disciplines, regions, and generations of mountain researchers.



LOOKING AHEAD: THE FUTURE OF THE ARU



Message:

Dr Glen Taylor:

Directorate Research Development

As the Afromontane Research Unit (ARU) celebrates its tenth anniversary, I am reminded of how vision, passion, and perseverance can transform an idea into a movement of lasting impact.

What began in 2015 as a bold initiative to create a unique research identity on the Qwaqwa Campus has flourished into a continental leader in African mountain research. The ARU has not only advanced world-class scholarship, but has also created a home where young academics, students, and international collaborators come together to tackle some of the most pressing challenges facing mountain communities.

From its early focus on building research capacity, to landmark achievements such as addressing rangeland degradation, publishing widely, and establishing the Risk and Vulnerability Science Centre, the ARU has consistently shown that locally grounded work can resonate globally.

This milestone is more than a celebration of past success – it is a reminder of the ARU's promise for the future: shaping knowledge, informing policy, and building resilience in Africa's mountain landscapes.

Message:

Prof Cias Tsotetsi:

Campus Vice-Principal:
Academic and Research

I congratulate the ARU on its various achievements, as it has benefited both staff and students. Over the past years – through the USDP in Mountain Research project – several staff members have benefited from the initiative, as they managed to complete their studies and are now PhD holders. This is in support of Vision 130, as the university aspires to be a research-led institution. I have noted other distinct achievements that benefit the university community, such as the establishment of the first alpine research base in South Africa used as a research facility, as well as successfully securing funding grants through international bilateral.

Earlier this year, I was fortunate to be part of SAMC2025, which built on SAMC2022. Undoubtedly, SAMC2025 was a huge success, as it brought together a diverse group of individuals and groups such as academics, royal houses, policymakers, researchers, early career professionals, to mention a few. Productive engagements and the exchange of experiences created space for fostering partnerships towards transboundary and transdisciplinary research. Lastly, SAMC2025, through the Royal Mountain Indaba, brought in traditional leaders as custodians of customary law.





CLOSING PAGE

Honouring our contributors

The ARU acknowledges with gratitude the hard work of the ARU-affiliated postgraduate students, postdoctoral research fellows, research champions, external affiliated fellows, advisory board and committee members, and other actors who have played a valuable role in the achievements of the past 10 years. The ARU management thanks the academic departments – along with the subject heads, heads of department, and faculty deaneries – with whom champions, fellows, and students are shared through the current ‘double-decentralised’ model that the UFS has chosen for the ARU, and who are beneficiaries of the ARU’s support.

Cheryl Lombard played a critically important role as ‘midwife’ to the ARU’s birth in 2015, and her continued passionate support and input over the years – most recently with Anton Lombard as part of the

Secretariat for the SAMC series. Deep appreciation for supporting the ARU’s journey and growth is extended to Prof Corli Witthuhn (former DVC: Research, Innovation and Postgraduate Studies), Prof Vasu Reddy (DVC: Research, Innovation and Postgraduate Studies), Dr Molapo Qhobela (DVC: Strategic Initiatives, International and Institutional Affairs), Dr Glen Taylor (Senior Director: Directorate Research Development), Prof Jared McDonald (former Vice-Principal: Academic and Research, UFS-QQ), Prof Pearl Sithole (former Campus Vice-Principal: Academic and Research, UFS-QQ), Prof Cias Tsotetsi (Campus Vice-Principal: Academic and Research, UFS-QQ), Dr Martin Mandew (former Campus Principal: UFS-QQ), Prof Prince Ngobeni (Campus Principal: UFS-QQ), Dr Cornelius Hagenmeier (former Director: Office for International Affairs), and Prof Lynette Jacobs (acting Director:

Office for International Affairs). Deep thanks are extended to the support staff in the Directorate Research Development, the Office for International Affairs, the Centre for Graduate Support, the Centre for Global Change, the Division of Human Resources, University Estates, the Department of Communication and Marketing, and the Department of Finance.

For making this magazine possible, the ARU team is deeply thankful to Prof Ralph Clark and Leonie Bolleurs (gathering of content and primary editorial work), Elize Gouws (language editing), Clifford Mokhoke (layout) from the Centre for Teaching and Learning, and all others whose contributions made this magazine possible. Printing was supported by UFS internal funds from the ARU’s annual operational budget.



Powering the mission

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Programme; GEOMountains; German Academic Exchange Service (DAAD); German Cooperation – Deutsche Zusammenarbeit; GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH; Global Mountain Biodiversity Assessment (GMBA); Global Mountain Safeguard Research Programme (GLOMOS); Global Observation Research Initiative in Alpine Environments (GLORIA); Government of Lesotho; Grassland Society of Southern Africa (GSSA); Hans Hoheisen Trust; IdeaWild; Institutional Advancement (UFS); International Long Term Ecological Research Network (ILTER); International Mountain Society (IMS); Lajuma Research Centre; Leipzig University; Leonie Bolleurs; Lesotho Highlands Development Agency (LHDA); Lesotho Northern Parks; Leuphana University; Madagascar National Parks; Maloti-Drakensberg Transfrontier Project (MDTP); Meat Naturally; Metano Media Advertising; Mountain Club South Africa (MCSA); Mountain Invasion Research Network (MIREN); Mountain Partnership; Mountain Research Initiative (MRI); Mozambique Mountain Initiative; Mozambique National Parks; Nanjing University; National Conventions Bureau; National Science Foundation (United States); National University of Lesotho; New South Wales Department of Primary Industries and Regional Development (Australia); Northern Drakensberg Collaborative (NDC); Office for International Affairs (UFS); Piggs Peak Hotel; Private landowners; Qwaqwa Campus Management Committee (QCMC); ReNOKA Transboundary Water Initiative; Rhodes University; Seldom Seen; Smithsonian Institution; Social Innovation Exchange (SIX); South African Association of Botanists (SAAB); South African

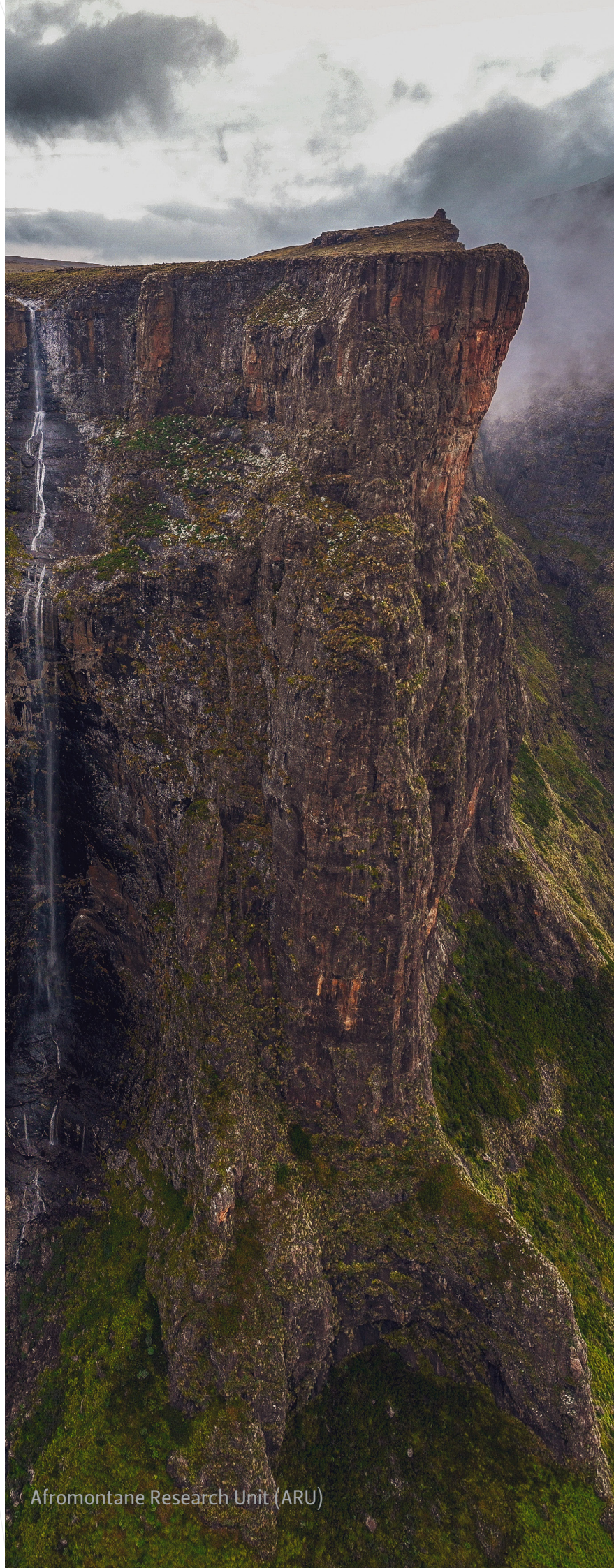
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Student collaborators

Postgraduate students have been central to the ARU's growth, contributing across research, outreach, and innovation.

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“Mountains are not only geographical features; they are metaphors of resilience, repositories of knowledge, and sentinels of ecological and cultural memory.”

– Anonymous, Traditional Wisdom

AFROMONTANE RESEARCH UNIT

A decade of research, discovery, and impact

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