

INSIDE:

The Council for Geoscience Reinforces its Drilling Capacity | 1

*Mahlako Mathabatha
Rofhiwa Raselavhe
Dan Magatkle*

CGS and PanAfGeo+ in Afrocentric Geoscience Advancement – Insights into the Bushveld Igneous Complex and its Mineral Endowment | 3

*Luyanda Ngcobo
Mahlitse Legong
Neithel Mashiane
Luzuko Chiya*

A Generic GIS-based Framework for Groundwater Potential Mapping | 7

*Chiedza Musekiwa
Lebogang Nhleko
Zininzi Phikiso
Taufeeq Dhansay*

Strengthening Geoscientific Collaboration and Benchmarking Global Best Practices: CGS Technical Visit to Finland | 9

*Ntsako Mhlarhi
Clement Ndou*

National Disaster Management Strategic Indaba: Science at the Heart of a Safer South Africa | 12

Sinovuyo Myendeke

Magaliesberg Catchment Management Forum Convenes and Adopts Strategic Targets | 14

Rhandu Mahlaule

Second Annual Women in Mining Conference: Empowering Women and Driving Transformation in Mining | 15

Sinovuyo Myendeke

Spend a Night at the Museum | 16

Annlin Matabane

Organisation of African Geological surveys (OAGS) – Enhancing Diplomacy through Geoscience | 18

*Remind Baloyi
Mbuyiseni Ngcobo*

Interview with Dr Lufuno Ligavha-Mbelengwa | 21

Annlin Matabane

The Council for Geoscience Reinforces its Drilling Capacity

In March 2026, the Council for Geoscience (CGS) expanded its strategic scientific asset base through the acquisition of a diamond core drill rig to symbolise strength, accuracy, and resilience in uncovering valuable geological information. The newly acquired drill rig – named “the Green Mamba” – will enhance CGS’s existing drilling capacity in support of its geoscientific programmes. This investment not only strengthens operational capability, but also reinforces the credibility of the CGS to contribute in expanding the geoscientific knowledge base.

This expansion of the drilling fleet is aligned with the CGS’s strategic direction of investing in asset recapitalisation

with the aim of improving efficacy and optimal delivery of its mandate. With a strengthened internal environment and improved capacity, the organisation is well positioned to deliver impactful geoscientific outputs. Accordingly, the drill rig will strengthen the understanding of geological conditions through fundamental geoscience research, while also strengthening geotechnical and groundwater assessments to deliver objective, evidence-based responses to societal challenges.

According to CGS CEO, Mr Mosa Mabuza, the acquisition comes at a critical time when exploration is gaining momentum in South Africa, with projects advancing exponentially and yielding desirable results from the



Figure 1. Council for Geoscience team and stakeholders posing in front of the new drill rig.

Junior Mining Exploration Fund (JEMF). “The Green Mamba will enhance the CGS’s capacity to provide technical support to the Department of Mineral Resources and Energy (DMRE) and the Industrial Development Corporation (IDC) in advancing the objectives of the JEMF”, said Mr Mabuza. Furthermore, Mr Mabuza added that the Green Mamba will strengthen the CGS’s capacity to support exploration initiatives, generate quality geoscientific data, and contribute to the growth and sustainability of the country’s mining sector.

The drill rig is a crawler-mounted, hydraulically-operated unit with the capability of drilling to a maximum depth of 2.7 km, significantly enhancing our understanding of geology. The rig will accelerate drilling activities that support fundamental geoscientific research and mineral exploration, thus underpinning robust mineral resources assessment, informed economic value, and scientific decision-making.

Mr Willem Meintjes, Executive Manager: Geoscientific Services, welcomed the acquisition of the Green Mamba, describing it as a significant achievement for the CGS and the culmination of extensive efforts to strengthen the organisation’s drilling capabilities. He expressed his satisfaction at seeing the drill rig operational in the field and emphasised its strategic importance in advancing the CGS mandate, supporting geoscientific research, and enhancing the organisation’s capacity to deliver critical subsurface investigations.

As part of ensuring the optimal utilisation of the drill rig and strengthening institutional capacity, eight employees from the CGS Technical Services Department, known as the A-Team, underwent specialised Core Drill Familiarisation Training with the supplier to enhance their ability to operate the Green Mamba drill rig. Upon successful completion of the training, certificates were awarded to Mr Dan Makgate, Mr Joel Masha, Mr Andrews Somo, Mr Maxwell Mufamadi, Mr Phathutshedzo Muthabine, Mr Simon Masango, and Mr Afika Songca. The training not only enhanced CGS’s in-house technical expertise but also its capacity to



Figure 2. Green Mamba drill in operation.



Figure 3: Mr Tshildzi shows recently drilled borehole core to the delegation led by CGS CEO, Mr Mosa Mabuza.





Figure 4. Drillers with their certificates.

undertake specialised core drilling operations in support of its mandate. Dr Thuli Khumalo, CGS Executive Manager: Corporate Services, presented certificates to the CGS A-Team and congratulated members on successfully

attaining new skills, encouraging them to apply their newly acquired knowledge effectively.

The A-Team, led by Chief Driller Mr Dan Makgatle, has since taken over the

operation of the Green Mamba drilling rig and has already completed the drilling of two boreholes as part of the operational deployment at a site in Giyani, Limpopo to further refine regional integrated mapping that the CGS completed in 2021 with the support of the local community and other critical stakeholders.

The CGS will continue to utilise this strategic asset together with the drilling community in South Africa to implement its geoscientific programmes and initiatives in the future, for the advancement of national socio-economic imperatives.

For more information, contact:

Mr Rofhiwa Raselavhe

Communication & Stakeholder Relations

rraselavhe@geoscience.org.za

+27 67 426 1111

Mr Dan Makgatle

Technical Services

dmakgatle@geosceince.org.za

+27 62 173 2842

CGS and PanAfGeo+ in Afrocentric Geoscience Advancement – Insights into the Bushveld Igneous Complex and its Mineral Endowment

PanAfGeo+ Work Package 2 (WP2) training

The Council for Geoscience (CGS) hosted the PanAfGeo+ Work Package 2 (WP2) training led by the Laboratório Nacional de Energia e Geologia (LNEG), Portugal between 4 and 15 May 2026. PanAfGeo+ brings together geoscientists from across the African continent to strengthen capacity in mineral resource assessment and related fields. This particular training focused on Mineral Resource Assessment, with the eastern Bushveld Igneous Complex (BIC) of South Africa as the field setting. The training supports the development of a formalised network of African experts under the Organisation of African Geological Survey (OAGS).

The training was attended by geoscience professionals from various geological surveys in Africa. It comprised theoretical lecture-type sessions – which covered the mineral exploration cycle from regional reconnaissance and prospecting through to advanced exploration and resource evaluation – and a practical field excursion in and around the town of Burgersfort in Limpopo Province.

The opening ceremony was led by Dr Tafeeq Dhansay, Acting Executive Manager: Integrated Geoscientific Development at CGS. Mr Kgosi Motsoane and Mr Ricardo Taveira Rodrigues provided words of support on behalf of the European Union and the Embassy of Portugal in South Africa, respectively. The training served as

a direct response to growing global demand for critical minerals, which often requires skilled geoscientists capable of applying modern exploration techniques, interpreting increasingly complex datasets, and contributing to responsible resource development.

Lecture presentations

The lecture presentations focused on various mineral systems of the Bushveld Complex, particularly those in the eastern part of the Rustenburg Layered Suite (RLS). They were designed around a typical pre-competitive project and structured as seven interlinked sessions covering various geo-datasets. These included:





Figure 1. Group photo of all attendees of the PanAfGeo+ training at the CGS auditorium in Silverton, Pretoria.

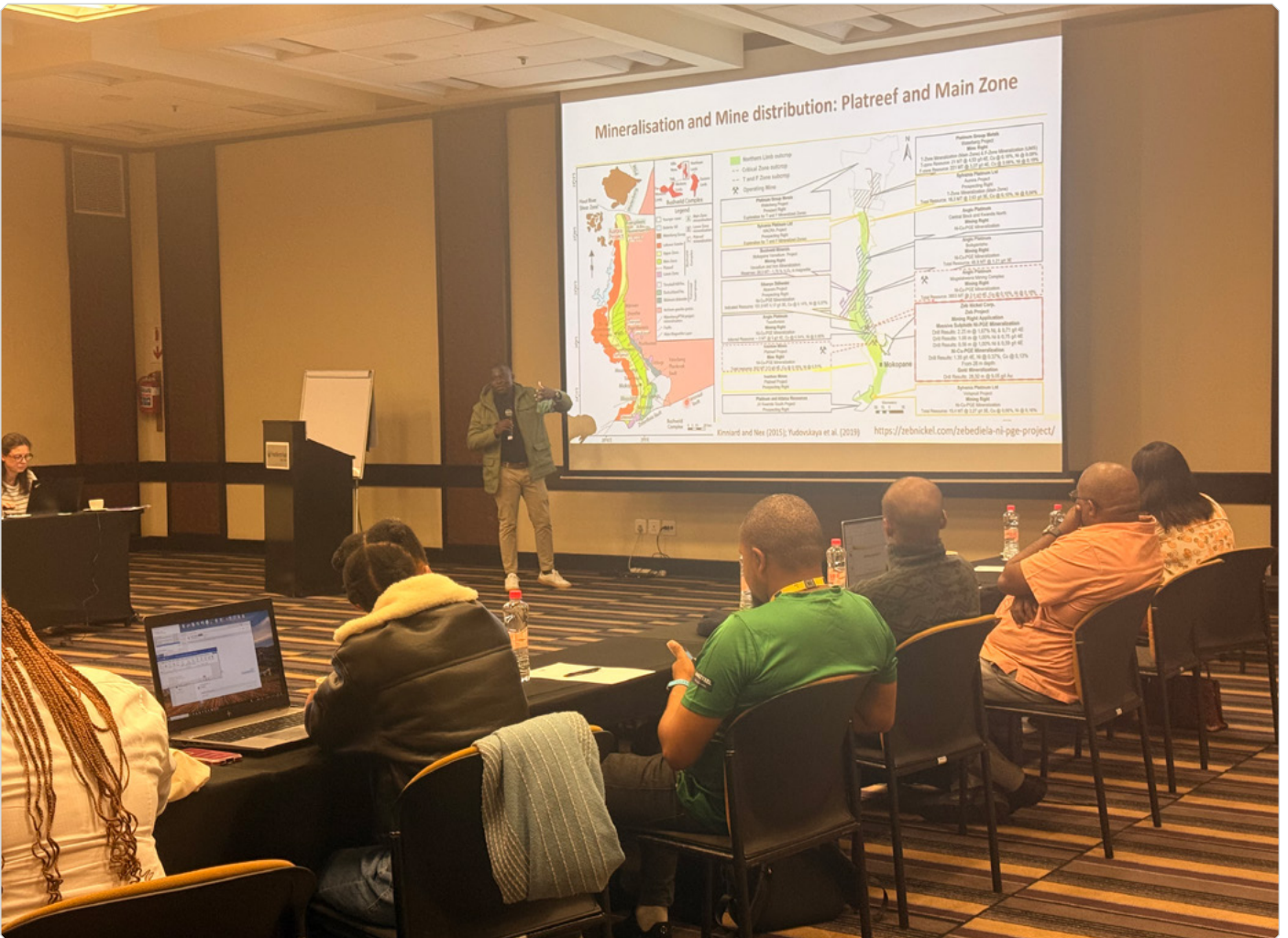


Figure 2. Lecture presentation on various mineral systems in the RLS by Dr Litshedzani Mutele.





Figure 3. Core logging activity focusing on the stratigraphic contact between the felsic and mafic components of the BIC. Demonstration of the typical process of hyperspectral core scanning.

- 1) regional geological overview of the BIC and the RLS in particular
- 2) indigenous geological knowledge and beneficiation of various commodities
- 3) regional geophysical surveys aimed at mineral exploration in the area
- 4) regional geochemistry assessment for identification of anomalous zones of various deposits
- 5) drill core analysis and hyperspectral tools for core logging and mineralogy
- 6) economic geology focused on the known deposits and prospective areas

The training concluded with a field excursion that put the theoretical sessions into practice. The sessions and the fieldwork emphasised the importance of a systematic approach to exploration and demonstrated how geological understanding evolves throughout the various stages of a project. By examining the progression from early target generation to detailed investigation, participants gained a broader appreciation of the processes required to transform geological observations into meaningful exploration outcomes.

CGS National Core Library visit

The training's first practical component took place at the CGS's National Core Library (NCL). Activities included assessing the drill core from the BIC with the aim of establishing the stratigraphy of the RLS, focusing especially on known stratigraphic zones associated with various mineral deposits and processes such as PGEs, chrome, vanadium, and titanomagnetite mineralisation. Participants logged the core and were also introduced to the state-of-the-art hyperspectral scanner used primarily for the assessment of drill-core mineralogy at the NCL. Participants also gained hands-on experience of the Virtual Core Library (VCL), which integrates various geoscientific datasets on a single platform.

Bushveld Igneous Complex field visit

The final part of the practical component included a field visit to the Eastern Limb of the BIC around Burgersfort town. The field visit was aimed at augmenting the theoretical sessions with ground truthing. The excursion reinforced the importance of integrating field observations with an array of geoscientific datasets when assessing mineral potential and evaluating exploration targets. The sites

of interest were confined to areas with known mineral deposits and included:

- 1) the UG3 chromitite seams at Maandagshoek and the Dwars River Heritage Site where UG1 chromitite seams of various thicknesses outcrop in the Critical Zone
- 2) the LG6 along the R37 road, characterised by illegal mining activity in the Critical Zone
- 3) the Main Zone package along the R555 road
- 4) the Main Magnetite Layer at Magnetite Heights in the Upper Zone
- 5) the overview of the iron-producing Mapoch mine in the Upper Zone near Roossenekal

Closing function

The programme concluded with group presentations, giving trainees an opportunity to demonstrate what they had learned from the training. An awards ceremony and dinner took place at CGS, at which certificates of completion were presented by Mr Mosa Mabuza, Chief Executive Officer of CGS, and Dr Maria João Batista, WP2 Leader.





Figure 4. (A) The infamous Dwarsrivier Monument where the UG1 outcrops near the platinum producing Dwarsrivier mine; (B) the Main Magnetite Layer with the magnetite pen demonstrating the magnetization of the layer; (C) The trainee giving a brief introduction to the site of Merensky Reef at Winnaarshoek; (D) The UG3 in Maandagshoek where lenses of chromitite seams are intercalated with pyroxenites and anorthosites.

The ceremony served to recognise the commitment shown by trainees during the intensive training programme.

The PanAfGeo+ WP2 Mineral Resources Assessment Training Programme was an educational and inspiring experience that broadened perspectives on mineral exploration and resource assessment. By combining theoretical instruction, field-based learning, practical application, and interaction with colleagues from across the continent, the programme demonstrated the value of scientific collaboration in addressing Africa's geological challenges and opportunities.

For more information, contact:

Luyanda Ngcobo
Business Development
nngcobo@geoscience.org.za
+27 (0)79 785 2354

Mahlatshe Legong
Minerals, Energy, Environment, and Groundwater
mlegong@geoscience.org.za
+27 (0)63 814 6286

Neithel Mashiane
Minerals, Energy, Environment, and Groundwater
nmashiane@geoscience.org.za
+27 (0)69 968 2999

Luzuko Chiya
Minerals, Energy, Environment, and Groundwater
lchiya@geoscience.org.za
+27 (0)81 701 1324



A Generic GIS-based Framework for Groundwater Potential Mapping

The geographic information system multi-criteria decision-making (GIS-MCDA) weighted overlay method is commonly used in mineral prospectivity, groundwater potential mapping, and site suitability studies. It is successfully applied in data-scarce regions, as the parameters used can be reduced and expert knowledge incorporated to fill in the gaps. It does not need accurate data such as borehole data to train the model, unlike data-driven or machine-learning techniques. A generic framework for implementing the weighted overlay method is presented using a groundwater potential mapping example. The preliminary steps include formulation of the problem and selection of the parameters that influence potential for inclusion in the model.

Datasets used as proxies for the parameters are collated and preprocessed. Pre-processing involves projection of the data into a projected coordinate system, as the subsequent processing requires the units to be in metres. Vector data are converted to raster format, as the process requires input data to be in this format (with cell values expressed as integers). The cell size of the raster data is determined by the size of the study area or spatial resolution of the most accurate dataset. Table 1 shows examples of the parameters, datasets, and the ArcGIS Pro tools used to transform the input data.

Each dataset is classified into classes and assigned values reflecting the potential of each class, for example: 3 = high potential, 2 = medium potential, and 1 = low potential. The needs of each study will dictate the number of classes to use. The parameter layers are assigned weights indicating their relative importance to potential. The classification is based on expert judgement guided by literature or ArcGIS Pro data classification tools (Table 2).

With the weighted sum tool used in this example, the weights have to add up

Table 1: The parameters, datasets, and the ArcGIS tool

| Parameter | Dataset | ArcGIS Pro tool (Extension required) |
|---|--|---|
| Geology/aquifer type | Polygon vector data | Feature to raster |
| Rainfall | Mean annual rainfall raster/point data | Inverse distance weighting (or other interpolation techniques (Spatial/3D/Geostatistical Analyst) |
| Proximity to drainage/faults/lineaments | Rivers, faults vector data | Euclidean distance/Distance accumulation |
| Slope/aspect | Digital elevation model raster | Slope (Spatial/3D Analyst) |
| Lineaments density | Lineaments line vector data | Line density (Spatial Analyst) |

Table 2: Parameter classes, values, and weights

| Parameter (unit) [abbreviation] | Weight | Class | Groundwater potential | Value |
|--|--------|-----------------------------|-----------------------|-------|
| Distance to rivers (metres) [DR] | 0.1 | 0–100 | High | 3 |
| | | 100–200 | Medium | 2 |
| | | > 200 | Low | 1 |
| Aquifer types [AT] | 0.25 | Intergranular | High | 3 |
| | | Fractured | Medium | 2 |
| | | Intergranular and fractured | Low | 1 |
| Lineament density (kilometres/square kilometre) [LD] | 0.2 | 1.7–7.6 | High | 3 |
| | | 0.5–1.7 | Medium | 2 |
| | | 0–0.5 | Low | 1 |
| Slope (degrees) [SL] | 0.2 | 0–15 | High | 3 |
| | | 15–60 | Medium | 2 |
| | | > 60 | Low | 1 |
| Rainfall (millimetres/annum) [RA] | 0.25 | 700–809 | High | 3 |
| | | 613–700 | Medium | 2 |
| | | 366–613 | Low | 1 |

to 1/100% (although this is not a strict requirement).

The potential map is created in ArcGIS Pro using the Raster Calculator or the Weighted Sum tool (Spatial/Image Analyst Extension) using the equation:

$$\text{Potential} = (0.1 \times \text{DR}) + (0.25 \times \text{AT}) + (0.2 \times \text{LD}) + (0.2 \times \text{SL}) + (0.25 \times \text{RA})$$

Figure 1 shows the input datasets and the validated potential map. The map

is classified into low, medium, and high potential classes.

Potential maps are validated using existing data or studies such as borehole points (Figure 1). Validation data points must be verified to ensure that the location is accurate otherwise incorrect results will be obtained. Overlay analysis is a simple validation approach used in which process the number of validation data points located in each class get counted. To show the model's good



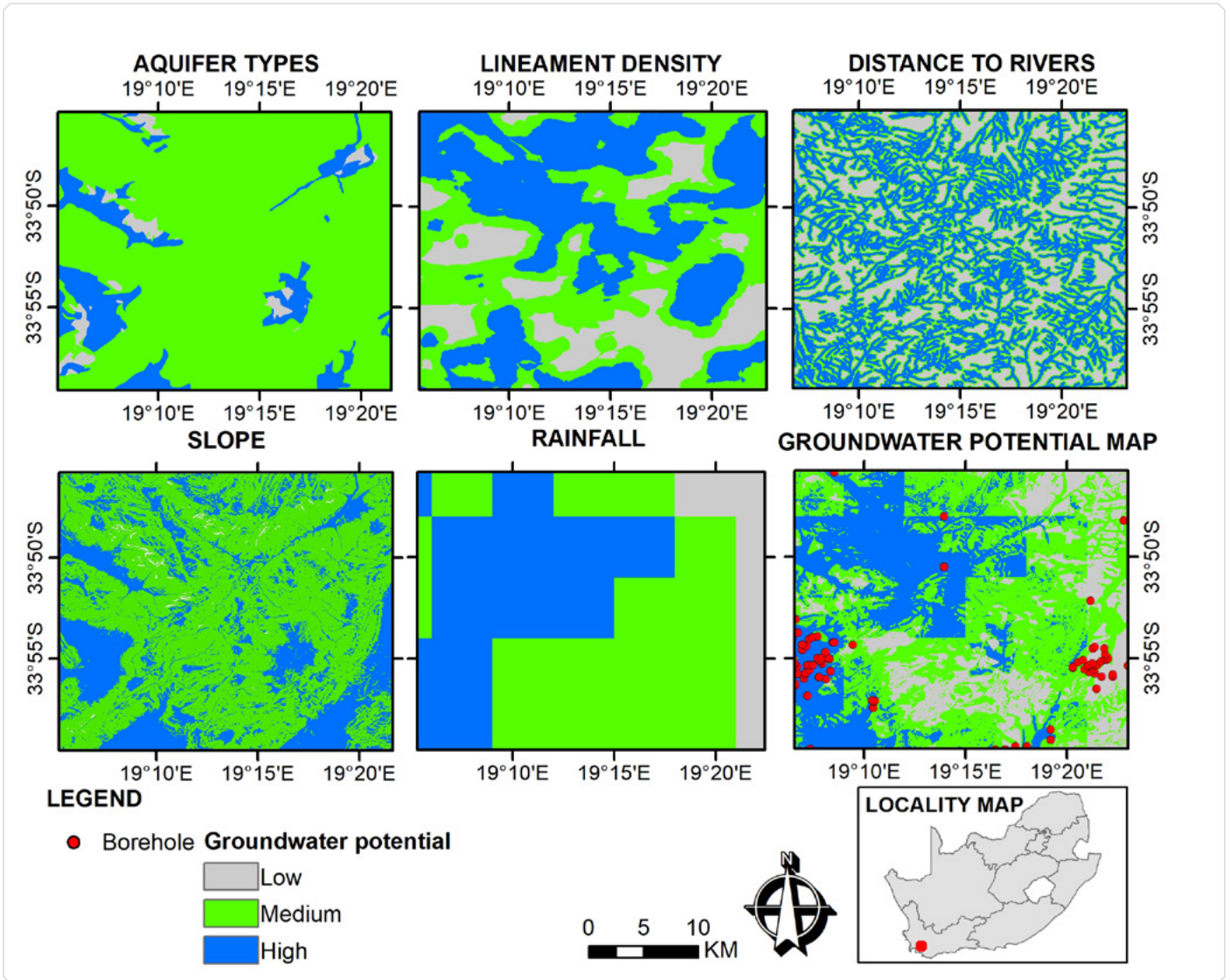


Figure 1. The datasets and the groundwater potential map.

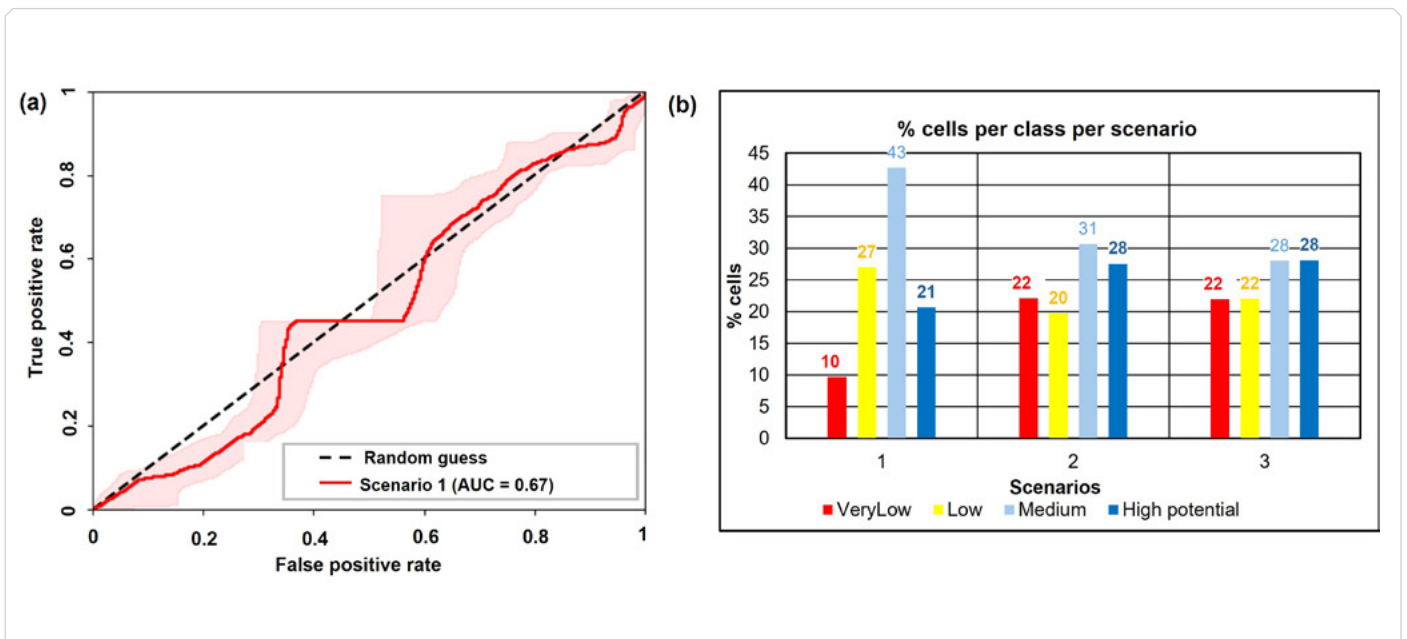


Figure 2. The figure shows: (a) a ROC graph generated from ArcSDM and (b) graph showing the proportion of cells per class from three scenarios.



prediction abilities, a larger proportion of the points should be in moderate to high potential areas. Using borehole data for validation, metrics such as receiver Operating Characteristic – Area Under the Curve (ROC-AUC) can be calculated and used to evaluate the performance of the models' abilities to discriminate between the potential classes. AUC values are computed using the ArcSDM add-on to ArcGIS Pro software. Low values indicate poor performance and high values excellent performance. Figure 2b shows an example of an ROC with an AUC value of 0.7, indicating poor or fair performance.

Shortfalls of the weighted overlay method include the use of subjective classifications and weighting methods. Scenario analyses are often used to evaluate the effects of these variations on the output. Scenario maps are created based on variations of the classes, ranks, and weights. The maps are compared cell to cell, and an assessment is done to determine the change of the class of a cell/pixel from one map to the next. Figure 2b shows an example of a graph showing the percentages of cells in each class for three scenarios.

Pearson correlation analysis and Kappa coefficients can also be used to compare the maps. Correlation coefficients show the strength and direction of relationships between two maps – values from around 0.70 to 1.00 show high correlation. The Kappa coefficient compares two maps at a time, cell by cell, to determine whether they are in spatial agreement. Kappa coefficients from 0.40 to 1.00 show moderate to almost perfect agreement. Kappa coefficients are calculated using tools such as the Map Comparison Kit (<http://www.riks.nl/products/Map-Comparison-Kit>).

Various weighting regimes are tested, and the final map is selected based on statistical analysis (e.g. ROC-AUC), comparison with verification data, or results from independent studies. Experts can be used to select the map that will best represent the status quo of the area. Regional scale potential maps, such as the one discussed here, include uncertainties based on data inaccuracies, resolution, and the modelling process, and are therefore most useful for planning and decision-making. Site specific studies for exploration purpose require

more detailed and accurate data (e.g. monitoring data).

A standard operating procedure document is under development highlighting the processes in more detail. This work is adapted from the publication below:

Musekiwa, C., Penn-Clarke, C., Nhleko, L. Charles, A. Phikiso, Z. & Dhansay, T. (2025). Assessing groundwater potential using GIS-MCDM and remote sensing techniques: A case study of Franschhoek, South Africa. *Water SA*, 51(4), 337–351. <https://doi.org/10.17159/wsa/2025.v51.i4.4119>

For more information, contact:

Chiedza Musekiwa

cmusekiwa@geoscience.org.za¹

Lebogang Nhleko

lnhleko@geoscience.org.za¹

Zininzi Phikiso

zphikiso@geoscience.org.za¹

Taufeeq Dhansay

tdhansay@geoscience.org.za²

¹Western Cape Unit

²Pretoria Office

Strengthening Geoscientific Collaboration and Benchmarking Global Best Practices: CGS Technical Visit to Finland

As part of its commitment to developing the National Borehole Core Depository (NBCD) into a world-class geological repository, the Council for Geoscience (CGS) undertook a strategic technical visit to Finland from 27 April to 1 May 2026. The delegation, led by Mr Willem Meintjes and accompanied by Mr Ntsako Mhlarhi and Mr Clement Ndou, visited the Geological Survey of Finland (GTK), Palsatech, and Specim to strengthen international collaboration, benchmark global best practices, and explore opportunities to enhance repository workflows at the NBCD.

The visit formed part of the CGS's broader strategy to establish a state-

of-the-art geological logging and data acquisition facility capable of supporting South Africa's growing geoscience, mineral exploration, and research needs. The engagements focused on knowledge exchange, operational benchmarking, technology advancement, and the identification of potential areas for future collaboration.

Deepening partnerships with the Geological Survey of Finland

The CGS delegation met with the Geological Survey of Finland (GTK) at its headquarters in Espoo, where discussions were led by GTK Director-

General Dr Kimmo Tiilikainen and senior members of the organisation. The engagement reinforced the long-standing relationship between the two geological surveys and highlighted opportunities for future collaboration based on mutual strengths and shared strategic objectives.

Discussions revealed significant alignment between CGS and GTK in areas such as critical raw materials research, mineral prospectivity mapping, groundwater management, geoscience information systems, environmental geoscience, and minerals required for the global energy transition, including lithium, rare earth elements, graphite, and other strategic commodities.



GTK showcased its expertise in geodata digitisation, mineral intelligence, groundwater management, and innovation-driven research. Of particular interest was GTK's mineral intelligence programme, which integrates geoscientific and market intelligence to support policy development and encourage exploration investment.

CGS highlighted its Integrated Multidisciplinary Mapping Programme (IMMP) and its growing contribution to addressing societal and economic challenges through geoscientific solutions. The discussions identified strong opportunities for collaboration in mineral prospectivity modelling, critical minerals research, geological mapping, and sustainable resource development.

Benchmarking National Core Archive operations

A key component of the visit was a benchmarking exercise at GTK's National Core Archive in Loppi. The facility houses approximately 4 000 kilometres of drill core and serves as a national repository for Finland's geological samples and associated data.

The visit provided valuable insights into large-scale repository management, geodata systems, specialised storage infrastructure, and workflow optimisation. At the same time, it highlighted several areas where the NBCD has developed notable strengths, particularly in the integration of hyperspectral scanning technology into routine repository operations and the generation of digital geological datasets through the Virtual Core Library (VCL).

The exercise demonstrated that both organisations possess complementary expertise and highlighted opportunities for future knowledge-sharing initiatives that could strengthen repository management, data accessibility, and digital geoscience capabilities in both countries.

Exploring modern core logging solutions with Palsatech

The delegation also visited Palsatech in Kemi to evaluate modern core logging



Figure 1. GTK delegates and CGS staff. From left to right: Eeva Käpyaho (GTK), Clement Ndou (CGS), Fredrik Karell (GTK), Ntsako Mhlarhi (CGS), Ollie Breilin (GTK), and Willem Meintjes (CGS).



Figure 2. CGS delegates with GTK analytical staff inside one of GTK laboratories.

infrastructure and workflow solutions that could support the continued development of the NBCD.

The visit demonstrated how advanced technologies, including electrically adjustable logging tables, ergonomic workstations, portable XRF systems, and integrated workflow platforms,

can improve the efficiency and quality of geological logging, sampling, and geochemical data collection. The integration of these systems with hyperspectral scanning workflows illustrated how geological data acquisition can be streamlined while improving workplace safety and operational efficiency.



The engagement provided valuable ideas for modernising NBCD operations through improved workflow integration, enhanced staff ergonomics, and more efficient data capture processes. These insights will assist the CGS in its ongoing efforts to establish a modern repository that supports research, mineral exploration, and national geoscience priorities.

Enhancing technical support and innovation through Specim

The final component of the visit involved engagements with Specim in Oulu, the original equipment manufacturer (OEM) of the hyperspectral scanner currently deployed at the NBCD.

Discussions focused on strengthening institutional relationships, improving technical support arrangements, enhancing equipment maintenance processes, and exploring new hyperspectral imaging technologies. Given the critical role of hyperspectral scanning in supporting the Virtual Core Library, these engagements are essential for ensuring the long-term reliability and effectiveness of the system.

The delegation toured Specim's production facilities, gaining first-hand insight into the assembly, calibration, testing, and certification processes used in the manufacture of hyperspectral imaging systems. The visit also included a repairs and maintenance workshop, which provided valuable understanding of equipment servicing requirements and preventative maintenance practices.

A highlight of the visit was a demonstration of the latest SisuROCK hyperspectral scanner, which incorporates an integrated LiDAR detector and enhanced imaging capabilities. The technology represents a significant advancement in automated geological data acquisition and provides valuable insight into future developments that could further enhance digital core logging and analysis at the NBCD.

Looking ahead

The technical visit reinforced the importance of international collaboration



Figure 3. National Core Archives, GTK.

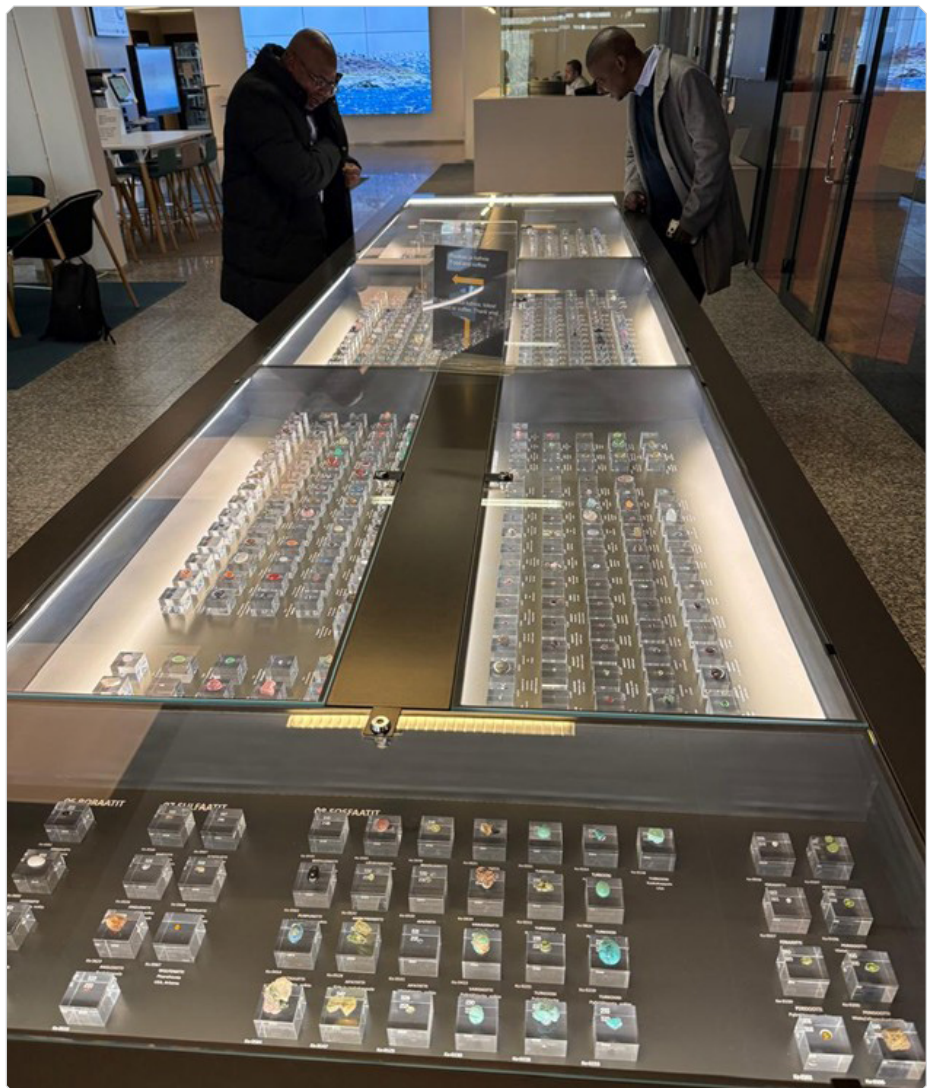


Figure 4. Mr Ntsako Mhlarhi and Mr Clement Ndou viewing a large display case showing a comprehensive collection of geological samples, such as minerals and crystals, at the GTK Museum.



in advancing geoscientific innovation, improving operational efficiency, and supporting sustainable resource

development. The engagements with GTK, Palsatech, and Specim offered valuable lessons, identified areas for

future collaboration, and highlighted technologies that can support the continued evolution of the NBCD.



Figure 5. CGS delegates and Specim senior staff members. From left to right: Willem Meintjes, Clement Ndou, Joni Siipola, Ntsako Mhlarhi, and Rainer Bärts.

As global demand for critical minerals and high-quality geoscientific data continues to grow, collaboration between organisations such as the CGS and GTK will play an increasingly important role in supporting scientific excellence, responsible resource development, and economic growth. The visit marks another important step in positioning the NBCD as a leading geological repository and data generation facility within Africa and the broader international geoscience community.

For more information, contact:

Ntsako Mhlarhi

Knowledge Management

nmhlari@geoscience.org.za

+27 (0)12 841 1069 /

+27 (0)81 258 9178

Clement Ndou

Knowledge Management

cndou@geoscience.org.za

+27 (0)60 929 3972

National Disaster Management Strategic Indaba: Science at the Heart of a Safer South Africa

On 14 April 2026, the Council for Geoscience (CGS) was represented at the National Disaster Management Strategic Indaba, held at Emperors Palace, Gauteng. The high-level gathering convened key stakeholders from government, scientific institutions, and strategic partners under a shared mandate: to assess the current state of disaster management in South Africa and chart actionable pathways towards a more resilient, data-driven national system.

The Indaba's purpose and mandate

The Indaba was convened to take stock of South Africa's disaster management architecture by identifying gaps, evaluating progress, and defining the

strategic direction needed to move the country from reactive response to proactive, risk-informed planning. The conversations were frank, urgent, and solution-orientated.

Key strategic focus areas

Strengthening the Disaster Management System:

A national review of the disaster management framework exposed critical gaps in coordination, implementation, and monitoring. Delegates strongly emphasised the need for a more integrated, data-driven system – one that effectively aligns with national, provincial, and municipal functions within a coherent risk-reduction strategy.

Disaster Response and Recovery.

An assessment of disaster grant

performance highlighted persistent systemic challenges: delays in fund disbursement and utilisation, inefficiencies in response coordination, and limited mechanisms for monitoring and evaluation. A clear and urgent call was made for improved governance, accountability, and faster, more transparent response systems.

Municipal Capacity and Support:

Municipalities emerged as the most vulnerable implementational level. Limited technical capacity, inadequate planning frameworks, and constrained resources leave local government least equipped to manage disasters effectively. Provincial interventions were highlighted as essential for strengthening institutional capacity, providing technical support, and ensuring service delivery remains resilient.



Funding and Sustainability. National Treasury underscored the imperative of sustainable funding models for disaster risk reduction, making the case that investment must shift decisively from reactive response to preventative action. Long-term fiscal sustainability depends on building resilience before disasters strike.

Governance, Audit, and

Accountability: The Auditor-General presented findings on recurring compliance gaps and deficiencies in financial oversight and reporting within the disaster management space. Strengthening governance systems was identified as a non-negotiable priority to restore public trust and improve outcomes.

Strategic Partnerships: The Indaba reaffirmed that no single institution can address disaster risk alone. Multi-sector collaboration across state-owned entities, such as Eskom, humanitarian organisations including the AI-Imdaad Foundation, and scientific institutions like the CGS, is essential for building the response capacity and community resilience South Africa urgently needs.

Key outcomes and insights

The Indaba converged on several defining conclusions that will shape South Africa's disaster management trajectory:

- Disaster risk management must be integrated, coordinated, and fundamentally data-driven.
- There is an urgent need to strengthen municipal-level implementation capacity.
- Improved early warning systems and scientific data integration are not optional; they are critical infrastructure.
- A decisive shift toward proactive risk reduction and long-term resilience planning is required.
- Stronger governance, monitoring, and accountability frameworks must be designed, enforced, and sustained.



Figure 3. CGS delegation participating in the Disaster Management Indaba (from left to right: Mr Bongani Msane, Ms Nomvelo Mkhize, Ms Sinovuyo Myendeki, and Ms Nqobile Mankayi)

What this means for CGS

The Indaba underscored a reality the CGS has long championed: that science is not peripheral to disaster management; it is foundational to it. The incorporation of hazard data, including seismic risk assessments, into national disaster management planning is no longer aspirational; it is imperative.

As South Africa's premier geoscience institution, with a core mandate spanning geohazard assessment, seismic monitoring, and scientific data provision, the CGS is uniquely positioned to contribute to a data-driven national disaster risk reduction framework. The Indaba identified several concrete opportunities for the CGS:

- Integrate seismic hazard insights directly into infrastructure and land-use planning frameworks.
- Strengthen early warning and monitoring systems informed by geophysical and seismological data.
- Support evidence-based decision-making across government sectors through accessible, high-quality scientific data products.
- Build multi-sector partnerships that embed geoscience expertise into disaster preparedness and response pipelines.

A nation at a turning point

The National Disaster Management Strategic Indaba made one thing unmistakably clear: South Africa is at an inflection point. The country's approach to disasters must evolve, not incrementally but fundamentally – towards a model that is anticipatory, evidence-driven, and institutionally robust.

The Council for Geoscience is ready and committed to play its part. By placing geoscience data at the centre of disaster risk reduction, the CGS contributes not only to national policy but to the safety, resilience, and future of every South African community.

Key take-away

Effective disaster risk management is fundamentally data-driven and requires an integrated, multi-sector approach, one that places scientific evidence at the heart of informed decision-making, infrastructure resilience, and proactive risk reduction.

For more information, contact:

Sinovuyo Myendeki
Infrastructure and Land Use
smyendeki@geoscience.org.za
+27 (0)12 841 1243



Magaliesberg Catchment Management Forum Convenes and Adopts Strategic Targets

The Magaliesberg Catchment Management Forum (MCMF) took place on 4 June 2026 at Cradle Moon Lakeside Game Lodge in Muldersdrift, where it successfully convened its first in-person meeting – a significant step forward in collaborative water resource governance for the catchment area. The session served as a formal “meet and greet”, enabling stakeholders to engage directly and establish a unified strategic direction. The Department of Mineral and Petroleum Resources (DMPR) was represented by the Honourable Ms Munyadziwa Ethel Sinthumule, Deputy Director: Mine Environmental Research and Sustainable Development.

Recently appointed chairperson, Charice Rocha, and her team presented an introductory session with the Limpopo-Olifants Catchment Management Agency (LOCMA). The agenda focused on catchment-wide governance matters, stakeholder participation, water resource management priorities, dam safety processes, water quality concerns, and the role of stakeholders within the catchment management framework. Knowledge-sharing across six catchment forums was identified as a

strategic priority. The Forum resolved to systematically collect and disseminate best practices from established catchment management forums across South Africa. By benchmarking successful interventions, the Forum intends to adopt proven methods for addressing priority challenges, including water quality degradation, invasive alien vegetation, and reduced ecological flow. The meeting further deliberated on the National Mine Closure Strategy, with particular emphasis on perpetual water liability provisions. Cumulative impacts are a recognized concern under the National Water Act principles, the Catchment Management Strategy principles, and the Integrated Water Resource Management (IWRM) framework.

The technical working groups will be mandated to coordinate an integrated stakeholder engagement framework, ensuring alignment between governmental departments, community representatives, scientific institutions, and industry partners. Ms Rhandu Mahlaule from CGS and Ms Munyadziwa Ethel Sinthumule from the DMPR will lead the technical working group for Integrated

Water Resources Management. Delegates unanimously adopted measurable targets for the forthcoming year and formed the technical working group dealing with:

- Water quality and monitoring
- Heritage and environmental protection
- Land use and development
- Disaster risk and infrastructure

Stakeholders engaged in constructive dialogue to explore mechanisms by which the MCMF can align with national policy directives while safeguarding water security for downstream users and ecosystems. The Cradle area forms part of a sensitive dolomitic groundwater system. Pollution pathways in karst systems can be rapid and difficult to remediate. Groundwater and surface water connectivity are central water-resource management concerns. The discussions were characterized by innovative and solution-oriented proposals. The Forum formally acknowledged the contributions of citizen scientists who continue to generate critical data on water quality and biodiversity within the catchment. The integrated approach seeks to combine community-based monitoring with professional scientific oversight, thereby strengthening the evidentiary basis for management decisions.

With the adoption of clear leadership, defined targets, and a commitment to evidence-based, collaborative action, the Magaliesberg Catchment Management Forum has established a robust foundation for its mandate. The outcomes of this inaugural physical meeting position the Forum to play a proactive and coordinating role in advancing sustainable water resource management within the Magaliesberg catchment.

For more information, contact:
Rhandu Mahlaule
rmahlaule@geoscience.org.za



Figure 1. Delegates assembled for the establishment of technical working groups dealing with water quality and monitoring, heritage and environmental protection, land use and development, and disaster risk and infrastructure.



Second Annual Women in Mining Conference: Empowering Women and Driving Transformation in Mining

On 8 May 2026, the Council for Geoscience was proudly represented at the 2nd Annual Women in Mining Conference, hosted by CTS Event Partners at the Indaba Hotel in Fourways, Sandton, Johannesburg. Themed “Empowering Women and Driving Transformation in Mining,” the conference brought together a distinguished group of women leaders, engineers, executives, and advocates from across the South African mining sector.

The day-long conference provided a platform for candid conversations about the state of gender equity in mining, the role of women in shaping the industry’s future, and the practical steps that organisations can take to accelerate transformation. Delegates from major mining companies, including De Beers Group, Exxaro Resources, Glencore, Anglo American Kumba Iron Ore, and Thungela, gathered to share experiences, insights, and strategies.

The Council for Geoscience in the spotlight

Among the highlights of the programme was the presentation by Dr Thakane Ntholi, Manager of Scientific Resources at the Council for Geoscience, titled “The Value of Geoscience Data in the Mining Value Chain.” Dr Ntholi’s address shed light on the critical role geoscience data plays in every stage of mining, from exploration and resource evaluation to production planning and environmental management. She underscored how accurate and accessible geoscience information underpins sound decision-making in the sector and emphasised the CGS’s mandate as a proud entity of the Department of Mineral and Petroleum Resources in supporting this vital function.

Figure 2. CGS delegation attending Women in Mining (from left to right: Ms Kwena Komape, Ms Pamela Nolaka, Ms Sinovuyo Myendeki, Ms Lebogang Sathekge, Dr Thakane Ntholi, and Ms Muneiva Mukwevho).



Figure 1. Dr Thakane Ntholi presenting on “The Value of Geoscience Data in the Mining Value Chain”



A powerful line-up of women leaders

Other notable presentations were delivered by a diverse line-up of speakers. Kelebogile Dlodla, CFO of De Beers Mining South Africa, and Matshidiso Gama, Section Manager: Mining at Anglo American Kumba Iron Ore, spoke on leadership and financial stewardship in demanding mining environments. Patronella Mochole, Principal Engineer: TMM at Exxaro Resources, brought a technical perspective to discussions on advancing women in engineering roles. Advocate Rudessa Harris from the Department of Mineral and Petroleum Resources provided a legal and regulatory lens, while Dimakatso Kesentswe Makgati of the Mine Health and Safety Council addressed technology transfer and

knowledge facilitation as tools for inclusion. Maryke Malan, Head of the eMalahleni Water Reclamation Plant at Thungela, highlighted the growing presence of women in operational and environmental leadership.

Charlotte J. Ramparsad, author and CEO of Green Glasses, brought an entrepreneurial voice to the programme, inspiring attendees to challenge conventional thinking and embrace purpose-driven leadership.

A commitment to transformation

The conference was a powerful reminder that the transformation of South Africa's mining industry is inseparable from the full inclusion of women at every level. It reinforced the importance of creating

spaces where women in mining and the geosciences can share knowledge, build networks, and inspire the next generation of leaders.

The Council for Geoscience remains committed to championing the role of women in the earth sciences and to contributing meaningfully to the national dialogue on gender equity in the resources sector. We look forward to continued collaboration with industry partners to drive this transformation forward.

For more information, contact:

Sinovuyo Myendeki
Infrastructure and Land Use
smyendeki@geoscience.org.za
+27 (0)12 841 1243

Spend a Night at the Museum

On 11 July 2025, the Ditsong Natural History Museum (DNHM) hosted the Night at the Museum event in collaboration with colleagues from the CGS Museum at their shared premises in Pretoria's Central Business District. The collaboration between the two entities began over a decade ago, with similar educational programmes and collaborative workshops, lectures, and book launches, led by both institutions' chief curators.

The Night at the Museum event began in the early evening with the arrival of local and international visitors of all ages. It proceeded with a stimulating itinerary, facilitated by DNHM officials throughout the overnight stay.

The Night at the Museum event takes place twice each month, from Friday evening to Saturday morning, with night tours running from 18h00 to 23h30 and morning tours and interactive learning sessions running from 07h00 to 08h30 the next day.

The evening began with a guided tour of the DNHM's extensive fauna, flora, and aquatic displays, including the *Bolts Farm* exhibition of large cats and the



Figure 1. The oldest petrified tree in Tshwane, and the *Triceratops horridus* cast

Unsung Heroes exhibition of indigenous South African researchers and scholars who served alongside many prominent researchers such as Prof. Raymond Dart. The evening ended with a fun quiz.

However, the educational games were the highlight of the evening. The natural-world/science-themed games are all age-appropriate and based on

current educational topics covered in the National Department of Basic Education's core syllabus and learning outcomes for learners aged 5–15. The games are played in groups, and participation from all attendees ensures an appropriate platform for alternative learning. Friends and parents are encouraged to apply their minds and extend their thinking beyond the exhibitions and tour guides'



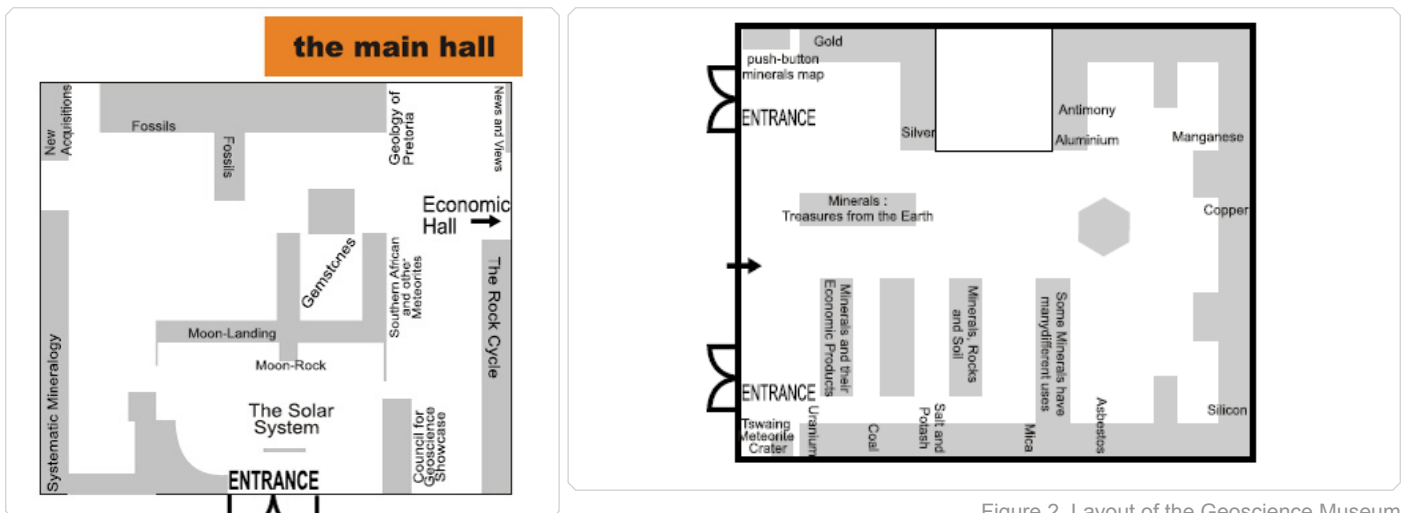


Figure 2. Layout of the Geoscience Museum

narratives by asking further questions about the evolutionary, planetary, and natural sciences. Visitors were encouraged to make use of the free Wi-Fi facilities and to use the DNHM and CGS websites to search for answers to the many hints, clues, and riddles hidden throughout the Museum.

After a brief pause for supper, the evening's festivities resumed with a glow-in-the-dark scavenger hunt, with kids and parents running around, climbing stairs and chairs, and looking more closely at the display cases and exhibitions for clues to the mystery grand prize. Visitors had an opportunity to re-engage with the interactive touch-sensor display cabinets in the Museum to reflect on and appreciate all they had learned from the guided night tours.

The evening's activities ended with a movie, appropriately titled *Night at the Museum* (2006), starring Ben Stiller, and the DNHM auditorium served as a movie theatre for the screening.

The 6 a.m. rise-and-shine sing-along provided just enough sunshine to freshen everyone up for the 7 a.m. tours. These began outside, allowing visitors to enjoy the beautiful memorial garden with its various indigenous flora, the iconic 65-million-year-old, three-horned-face cast of the Triceratops Dinosaur (*Triceratops horridus*), a cast of the Deinonychus Dinosaur (*Deinonychus antirrhopus*), and a cast of the second largest whale on earth, the Fin whale (*Balaenoptera physalus*) at the main pedestrian entrance.

The visitors were encouraged to observe one of the oldest petrified trees in Tshwane on the way to the Ditsong Museum's Discovery Centre.

Following an evening of "do not touch the displays" in the main exhibition halls, the interactive Discovery Centre, with its strong sensory emphasis, was enjoyed by the younger children. They played with authentic Zulu drums, touched various replicas of living and extinct animal skins and hides, climbed into a large cast baobab tree, and created their own theatre production with props, finger puppets, and toys. More games were played inside, and, finally, visitors were ushered into the Council for Geoscience Museum.

As the last stop on the night tour experience, the CGS Museum's self-guided exploration of South Africa's mineral wealth provided visitors with tangible evidence of the mineralogy of the Earth's lithosphere.

Attendees were encouraged to explore the CGS Museum themselves, with pamphlets and the interactive screen providing a unique experience of the Earth and planetary sciences. The CGS Museum Curator conducted a brief tour, beginning with the Earth and planetary sciences display of meteorites, the systematic mineral display, and the sensory exhibition, which includes one of the world's largest crystals' available for visitors to touch and feel.

Visitors were enthralled by the beautiful, bright gemstone exhibition, the detailed rock cycle display, the Tsumeb mineral

display, and the bold Copper display. In the economic hall, the display includes various coal specimen types and hazardous materials, such as radioactive uranium and different asbestos specimens.

The CGS Museum tour ended with a group photo next to the monthly themed centrepiece display of *Rhodoshrocite* from Hotazel in the Northern Cape Province of South Africa, and visitors were invited to explore the reading corner, complete the CGS Museum visitors' book, join the local Pretoria Gem and Mineral Club, follow the CGS Museum's various social media platforms, explore the CGS website, and download the CGS Mobile App by scanning the available QR codes.

The final stop on the itinerary was an optional visit to the local Maribelo restaurant within the Museum for a hearty, traditional African lunch.

The CGS Museum would like to invite all of its stakeholders to this exciting and scientifically enthusing experience. To join future events hosted by the DNHM in partnership with the CGS Museum, or to book a private Night at the Museum experience, contact museum@geoscience.org.za for more details.

For more information, contact:

Annlín Matabane
Knowledge Management
amatabane@geoscience.org.za
+27 (0)67 599 9304



Organisation of African Geological surveys (OAGS) – Enhancing Diplomacy through Geoscience

The 17th General Assembly of the Organisation of African Geological Surveys (OAGS), held in Entebbe, Uganda, marked a significant moment in the evolution of Africa's geoscience community. Rooted in a rich history of continental cooperation, OAGS has steadily advanced its mandate of promoting geoscientific excellence, sustainable resource management, and socio-economic development across Africa. Over the years, the organisation has transitioned from a coordination platform to a fully operational institution, reinforced by its establishment as a legal entity (non-profit company under the statutes of South Africa) and supported by its Permanent Secretariat hosted by the Council for Geoscience of South

Africa. The Secretariat continues to provide governance, strategic direction, and operationalisation of the organisation's strategic vision, ensuring alignment with both continental and global development imperatives. This institutional maturity reflects the growing recognition of geoscience as a strategic pillar in Africa's development

agenda, aligned with continental frameworks such as the African Union's Agenda 2063, which articulates a long-term vision for inclusive growth, sustainable development, and structural transformation across the continent.

Elections

A key highlight of the Assembly was the successful conduct of elections, which reaffirmed the organisation's commitment to good governance and democratic processes. The transition marked the conclusion of the tenure of the outgoing Executive Committee, led by Senegal as President, which steered the organisation over two consecutive terms, an unprecedented



Mr Gabriel Data
OAGS President
Geological Survey of Uganda



Mr Jacques Nestor
OAGS Vice-President Eastern Region
Geological Service- Madagascar



Mr Maxwell Boateng
OAGS Vice-President Western Region
Ghana Geological Survey Authority



Mr Karim Mokhtar
OAGS Vice-President Northern Region
The Geological Survey Agency of Algeria (ASGA)



Ms Luisa Mahocha
OAGS Vice-President Southern Region
National Director of Geology and Mining-Mozambique



Dr Raoul Wazenga Vitima
OAGS Vice-President Central Region
Geological Survey of Congo (SGN-C)



Mr Mosa Mabuza
OAGS Secretariat
Council for Geoscience



Dr Rokhaya Samba Diene
OAGS Ex Officio Member- President
National Geological Survey of Senegal



development in its history. The President was supported by Vice Presidents – also serving two consecutive terms – representing the Southern region (Namibia), Eastern region (Uganda), Northern region (Algeria), Western region (Burkina Faso), and Central region (Central African Republic).

Building on this foundation, Uganda was elected to the Presidency, ushering in a new leadership cycle, while regional representation was strengthened through the election of Vice Presidents from the Central (Democratic Republic of Congo), Eastern (Madagascar), Northern (Algeria), Southern (Mozambique), and Western (Ghana) regions. This leadership transition ensures continuity while injecting renewed energy into the organisation's strategic direction, reflecting both institutional stability and renewal. Furthermore, the elections underscored the principle of regional inclusivity, which remains central to the governance model of the OAGS and its capacity to respond effectively to the diverse geological and developmental contexts across the African continent.

OAGS incoming Executive Committee members

Central to the General Assembly's deliberations was the regional approach to geoscience, which recognises that geological formations and mineral systems transcend political boundaries. By fostering collaboration across regions, OAGS enables member states to share data, harmonise methodologies, and jointly address challenges such as resource mapping, geohazards, and environmental stewardship. Regional reports presented during the Assembly highlighted both progress and persistent challenges, including disparities in technical capacity, data availability, and infrastructure. However, they also demonstrated a shared commitment to strengthening intra-African cooperation and reducing reliance on external partners.

OAGS partnership

Partnerships remain a cornerstone of the work of the OAGS, underpinned by longstanding collaborations with key institutions such as EuroGeoSurveys

(EGS) and other international stakeholders. Initiatives like PanAfGeo+ continue to demonstrate the value of these partnerships in strengthening technical capacity, facilitating knowledge exchange, and advancing the development of Africa's geoscience workforce. At the same time, the General Assembly underscored the importance of ensuring that such collaborations are equitable, transparent, and firmly aligned with African priorities, so that they deliver tangible and sustainable benefits to member states.

In this context, the relationship between OAGS and EGS was further strengthened through renewed high-level engagement and a shared commitment to closer coordination. Both organisations reaffirmed their strategic partnership and agreed that the existing Memorandum of Understanding remains fit for purpose. The focus has therefore shifted towards the development of a forward-looking strategic framework to clarify roles, strengthen coordination, and guide the implementation of joint initiatives in a more coherent and mutually beneficial manner. This renewed alignment reflects



Figure 1. Former OAGS President, Dr Rokhaya Samba-Diene (Senegal) delivering a keynote address at the 17th OAGS General Assembly in Entebbe, Uganda.





Figure 2: Members of the OAGS Executive Committee and Strategic Partners at the 17th OAGS General Assembly in Entebbe, Uganda.

a shared commitment to rebuilding trust, deepening cooperation, and positioning the partnership on a more structured and sustainable footing for the future.

In support of strengthening regional partnerships, the Secretary-General, Mr Mosa Mabuza, participated in the PanAfGeo+ INVEST Kick-off Meeting in Kinshasa, Democratic Republic of Congo (DRC), from 17–18 March 2026. The initiative sought to reinforce geoscientific capacity and promote collaboration across Africa. The event provided a strategic platform to deepen cooperation between African Geological Surveys and their European counterparts, ensuring that programme activities remain aligned with OAGS' strategic priorities. The host, OAGS Central Region Vice-President, Mr Raoul Wazinga, highlighted the DRC's significant untapped mineral potential and acknowledged partner contributions.

Subsequently, the Netherlands Geological Survey (TNO) and the CGS presented the South Africa Country Window, a programme focused on sustainable mineral development, critical minerals management, geological mapping, and decarbonisation through international scientific cooperation. This programme

will soon be launched in South Africa to expand the knowledge base and deliver with social and socio-economic benefits aligned with national priorities.

The Permanent Secretariat of the OAGS

Importantly, the role of the Permanent Secretariat (CGS) in South Africa extends beyond administrative coordination, establishing it as a central strategic leader in advancing the organisation's mandate. It positions South Africa as a key driver of continental geoscience diplomacy. This institutional arrangement provides a platform through which South Africa can participate through OAGS as an instrument of its broader foreign policy objectives, particularly in advancing regional integration, economic cooperation, and sustainable development. Through its active participation in OAGS programmes and leadership structures, South Africa reinforces its commitment to Pan-Africanism and multilateral engagement.

In this context, the OAGS framework can be viewed as part of a broader diplomacy programme that integrates

science and foreign policy. By promoting collaboration in geoscience, South Africa contributes to building strategic partnerships, strengthening regional stability, and enhancing Africa's collective capacity to negotiate in global resource governance. This science-driven diplomacy not only supports national interests but also advances the continent's shared developmental aspirations.

In conclusion, the 17th General Assembly demonstrated that OAGS is not merely a technical body, but a strategic institution at the intersection of science, policy, and diplomacy. Through its leadership, regional approach, and partnerships, it continues to shape the future of Africa's geoscience landscape while contributing to the continent's long-term development trajectory.

For more information, contact:

Remind Baloyi

rbaloyi@geoscience.org.za

Mbuyiseni Ngcobo

mngcobo@geoscience.org.za



Interview with Dr Lufuno Ligavha-Mbelengwa

Congratulations on earning your PhD! Can you tell us about your research topic and what inspired you to pursue it?

My PhD research integrated emerging organic contaminants (EOCs) and traditional tracers into a multi-tracer approach to assessing groundwater flow dynamics, delineating contamination sources, and tracing water ingress into mine voids within karst and mixed-source contamination environments.

I became aware of EOCs, which were then considered compounds of emerging concern, when I began my career. My interest grew as I learned more about the risks these substances pose to groundwater, human health, and surrounding ecosystems. As a geohydrologist, I was particularly interested in how these compounds could be used to better understand groundwater flow and transport. This led me to investigate how EOCs could enhance groundwater studies.

What were some of the most significant challenges you faced during your PhD journey, and how did you overcome them?

The journey was demanding and at times emotionally taxing. There were periods when I felt uncertain about my direction and questioned whether I would be able to complete my research. The delays and exhaustion were difficult to manage, and at times I experienced significant anxiety. At some point, when I thought I was done, I had to return to the field to collect additional data and revise my work. Those challenges humbled me and reminded me that excellence often demands more than we initially expect to give. Some days I felt strong and made much progress, while on others I felt completely overwhelmed and could not do much.

Over time, I came to understand that progress does not always look like speed; sometimes it looks like trying again and

refusing to quit. I had to keep reminding myself why I started and what the achievement would mean for my future. I leaned on prayer, meditation, mentorship, and the support of those around me to stay grounded and keep moving forward.

Looking back, what has been the most rewarding moment of your doctoral studies?

The most rewarding part of the journey has been the lessons I learned and the person I became along the way. I learned that success is a journey shaped by discipline, perseverance, resilience, patience, mentorship, consultation, faith, courage, and a willingness to keep learning. I also came to appreciate that growth is not always visible. Sometimes it happens quietly through private struggles, difficult choices, and the decision to keep going when no one sees how hard it is. These experiences continue to shape me both professionally and personally. For me, this achievement is more than a certificate or title; it is evidence that I carried a dream through pressure, sacrifice, fatigue, disappointment, and uncertainty, and continued to show up even when it wasn't easy.

How do you see your research contributing to your field, our organisation, or the communities we serve?

My research contributes to hydrogeology by demonstrating that EOCs, when used alongside traditional tracers, can serve as effective complementary tools for characterising groundwater flow and for delineating flow boundaries. The work advances tracer-based methodologies by broadening the range of environmental tracers available for hydrogeological investigations. Additionally, the research presented a novel application of EOCs as tracers of water ingress into mine voids, highlighting their potential for identifying and mapping ingress pathways.

For our organisation, the research makes a valuable contribution by providing



Figure 1. Dr Lufuno Ligavha-Mbelengwa

practical tracer-based approaches for aquifer system characterisation, groundwater contamination assessment, and mine water management. The multi-tracers can be applied to trace groundwater flow paths and aquifer connectivity, and can identify recharge areas, thereby strengthening investigations that support effective groundwater resource management. The research also contributes to projects that seek to evaluate aquifer vulnerability to contamination, as specific compounds can be linked to anthropogenic activities. The approach of using EOCs to map water ingress can be implemented in mine water management projects.

For the community we serve, the research findings provide a scientific basis for evidence-based decision-making and management practices aimed at protecting groundwater resources that people depend on for various purposes. By improving understanding of contamination risks, sources, and pathways, the research helps reduce potential human exposure to harmful pollutants. Additionally, the findings contribute to raising community awareness about the impacts of anthropogenic activities on groundwater quality.



Balancing work, studies, and personal commitments can be demanding. What strategies helped you stay focused and motivated throughout your PhD journey?

Balancing work, study, and personal commitments was especially challenging during the first two years, when I was still finding my rhythm and consistency. By the third year, I became more intentional and recognised that time was moving quickly while my progress was not where I wanted it to be. At one point, I even considered resigning from my job to focus on my studies full-time. Throughout the journey, I benefited from a strong support structure. My family regularly checked in to encourage me, and I was often reminded to reflect on why I had started and what the goal meant to me. My husband was a constant source of support, helping to create the time and space I needed to focus on my research outside working hours. His support made the journey feel possible, even during the most difficult periods.

As a woman in science, what advice would you give to young women and girls who aspire to pursue careers in research and innovation?

It is encouraging to see young women and girls who already know the path they want to pursue. Achieving the goal requires commitment, discipline, and consistent effort. Research and innovation are powerful tools for creating positive change, so it is important to find a mentor you trust, someone with whom you can share both challenges and successes, and who can offer guidance and encouragement. Believe in your abilities and have confidence in the value of your scientific contribution. No one knows everything, so remain open to asking questions, learning, and growing.

There will often be distractions that can pull you away from your purpose. Ignore what does not support your goals and keep your motive and goal top of mind. Do not wait for others to define what is best for you; instead, reflect on what aligns with your interests, values, and aspirations, and pursue it with confidence and determination. As you win, remember to support and uplift others in their journeys.

Now that you have achieved this important milestone, what are your future goals and aspirations, both professionally and personally?

My professional growth lies in contributing to the geoscientific field through impactful research that supports sustainable groundwater development and management. I hope my contributions will help inform evidence-based policy and decision-making. I also aim to establish myself as a leading researcher who contributes to supervising and mentoring students and early-career scientists. Lastly, I hope to continue publishing impactful research and sharing my work through national and international conferences and platforms beyond academia.

Personally, I aspire to strive to maintain a healthy work-life balance. I also hope to keep inspiring and empowering young people to appreciate the value of education, hard work, and self-belief. I am also interested in community development and would like to strengthen that contribution through knowledge-sharing and outreach activities.

For more information, contact:

Dr Lufuno Ligavha-Mbelengwa
Minerals, Energy, Environment, and
Groundwater
[lligavhambelengwa@geoscience.org.za](mailto:liligavhambelengwa@geoscience.org.za)
+27 (0)12 841 1306

If you would like to be added to the CGS mailing list, please send an e-mail to:

Ms. Mahlako Mathabatha, Communication & Stakeholder Relations
mmathabatha@geoscience.org.za

Private Bag X112, Pretoria 0001, South Africa /

280 Pretoria Street, Silverton, Pretoria 0184, South Africa

Tel: +27 (0)12 841 1911 / Fax: +27 (0)12 841 1221 / www.geoscience.org.za

