



NEWSLETTER

2025 AUTUMN GRADUATION SPECIAL

CWRR

MAKING A DIFFERENCE - ONE DROP AT A TIME

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THE NEW CWRR NEWSLETTER

Welcome to the fourth, SPECIAL GRADUATION issue of the CWRR Newsletter 2025! As always, the CWRR Newsletter carries news and updates from our members, including staff, associates and students. For contributions, suggestions and queries, please email Dr Shaeden Gokool, GokoolS@ukzn.ac.za



CWRR CELEBRATE OUR 2025 AUTUMN GRADUATES

In May 2025, a proud group of CWRR students received their hard-earned degrees, celebrating this milestone alongside fellow students, friends, and family. The Graduation Ceremony marked the culmination of their dedication, curiosity, and academic perseverance.

We are thrilled to celebrate Dr Tiffany Aldworth, who was awarded her PhD. This remarkable achievement reflects years of hard work, critical inquiry, and commitment to advancing knowledge in the field. Congratulations, Dr Aldworth!

A hearty round of applause goes to our Master's graduates: Evania Chetty (Food Security), Siphamandla Daniel (Agrometeorology), Gary Denton (Agrometeorology), Simon Lake (Hydrology, *Cum Laude*), Thobeka Mpungose (Hydrology, *Cum Laude*), and Ameera Yacoob (Hydrology, *Cum Laude*). Your success represents not only academic excellence but a passion for solving real-world challenges through science and innovation.

We also proudly recognise our Hydrology Honours graduates: Nobuhle Cele, Senamile Gasa, Thobeka Kunene, Aneme Majola, Sanelisiwe Mchunu, Abulele Mgxobane, Sbonelo Mtetwa (*Cum Laude*), Faith Sibiyi, Zingisa Tuswa, and Zamani Zulu. You have laid a strong foundation for your future journeys. May this be the first of many academic and professional accomplishments.

The CWRR community celebrates each of you. We look forward to seeing your continued impact in advancing water research and sustainability across South Africa and beyond.

FROM SAVANNAS TO SOLUTIONS: DR TIFFANY ALDWORTH EXPLORES THE WATER IMPACTS OF WOODY ENCROACHMENT



Dr Tiffany Aldworth was awarded her PhD in Hydrology for her thesis, '*Hydrological Implications of Woody Encroachment in the Semi-Arid Savannas of South Africa*'. Tiffany's research combined in-situ hydroclimatological measurements and satellite data to evaluate the impact of indigenous woody encroachment on evapotranspiration and soil water in a semi-arid savanna ecosystem located in the Greater Kruger National Park region. This work formed part of a larger South African Environmental Observation Network (SAEON) project that sought to determine the impact of increasing woody vegetation cover on the ability of southern African ecosystems' to supply freshwater. Tiffany admits that she found the PhD journey to be a challenging journey, and she credits her supervisors, Dr Michele Toucher and Prof. Alistair Clulow for their guidance and support. She also thanks Dr Tony Swemmer and Dr Shaeden Gokool for their contributions to the project. Tiffany has been working in consulting for the past 3 years and will soon be joining SRK Consulting.





LAYERS OF INSIGHT: THOBKA MPUNGUSE EXPLORES THE HIDDEN LINKS BETWEEN GROUNDWATER AND SURFACE WATER 🎓

Ms Thobeka Mpungose was awarded her MSc in Hydrology (Cum Laude) for her thesis titled *"Investigating Groundwater and Surface Water Interactions in the Umgeni Catchment, KwaZulu-Natal, South Africa,"* supervised by Prof. Seifu Kebede Gurmessa. The research applied stable isotopes ($\delta^2\text{H}$ and $\delta^{18}\text{O}$), Radon (^{222}Rn), baseflow separation, piezometry and hydrochemistry to assess groundwater recharge, flow and discharge processes. Thobeka's work is now continuing at PhD level with support from the Water Research Commission, under which she is an Emerging Scholar. *"I am excited to build on my MSc to develop a coupled groundwater and surface water interaction model aimed at aiding in the understanding of groundwater flow processes. This understanding is key to integrated water resources management, supporting the sustainable use and protection of groundwater systems,"* Ms Mpungose says.



MAPPING THE FUTURE: SIMON LAKE MODELS RAINFED CROP POTENTIAL FOR FOOD SECURITY 🎓

Mr Simon Vernon Lake was awarded his MSc in Hydrology (Cum Laude) for his thesis titled, *"A Novel Approach to Mapping Areas Suitable for Rainfed Production of Bambara Nut and Cowpea,"* supervised by Mr Richard Kunz. Motivated by the growing need to adapt agriculture to increasing water scarcity in South Africa, Simon's research focused on two underutilised, indigenous, and water-efficient crops with the potential to strengthen food and nutrition security among smallholder farmers.

Using the AquaCrop model, Simon conducted 49 seasonal simulations for bambara nut and cowpea across South Africa, considering four different planting months (October to January). For the first time, these simulations incorporated frost risk by adjusting the crop growing season based on critical minimum temperature thresholds (5.4°C), helping to simulate yield loss or crop failure more accurately.

Findings from the study revealed that planting date plays a crucial role in determining crop suitability, with bambara nut favouring early plantings and cowpea performing better with later ones. Coastal regions of KwaZulu-Natal and the Eastern Cape were identified as highly suitable for cultivation, while frost-prone inland areas showed only marginal to moderate suitability.

Simon's work formed part of a broader Water Research Commission-funded project (C2023/24-01254) and demonstrates the importance of simulation-based approaches for guiding agricultural planning. His findings highlight how crop suitability mapping can inform climate-resilient strategies for smallholder farmers in South Africa.



FROM PIXELS TO PRODUCTIVITY: EVANIA CHETTY HARNESSSES UAV IMAGERY TO BOOST SMALLHOLDER YIELDS 🎓

Smallholder farms in sub-Saharan Africa are fundamental to food security yet face multifaceted challenges, including reliance on traditional practices, limited access to resources, finance, and markets, climate variability, and population pressures. These factors contribute to a persistent productivity gap, exacerbating food insecurity. Precision agriculture (PA) offers data-driven approaches to enhance yields and optimise resource use; however, its prohibitive cost and complexity restrict adoption by resource-constrained smallholders. Ms. Evania Chetty's research in Agriculture, specialising in Food Security, evaluates low-cost unmanned aerial vehicle (UAV) RGB imagery as a viable alternative to costly multispectral data. Using machine learning on data collected in Swayimane, KwaZulu-Natal, her study compares UAV RGB and multispectral imagery for cropland classification and Leaf Area Index (LAI) prediction, a critical indicator of crop growth and development. Findings demonstrate UAV RGB imagery as a reliable, affordable tool to support PA adoption, thereby improving resource management and agricultural productivity and contributing to sustainable food security in financially constrained sub-Saharan African regions. Evania was supervised by Dr Shaeden Gokool and Dr Maqsooda Mahomed



FROM FIELD TO FUTURE: AMEERA YACOOB'S AWARD-WINNING WORK PIONEERS PRECISION HYDROLOGY 🎓



Ms Ameera Yacoob was awarded her MSc in Hydrology (*Cum Laude*) for her thesis titled, "Advancing Precision Water Management in Smallholder Sugarcane Farming: Leveraging Unmanned Aerial Vehicle-Based Remote Sensing and Machine Learning for Evapotranspiration and Water Stress Assessment." Over the past two years, Ms Yacoob has achieved a series of academic and leadership milestones. She presented her research at both local and national conferences, earning second and first prizes at UKZN's Postgraduate Research and Innovation Symposia in 2023 and 2024, respectively. A highlight was being named a top-five student presenter at the South African Hydrological Society Conference. She also celebrated her first peer-reviewed publication, with two additional manuscripts currently under review. In 2024, she was selected as a GreenMatterZA Fellow and took part in leadership and sustainability workshops. As Deputy Chair of a student-led initiative within the CWRR, she coordinated outreach and digital content focused on water security and climate resilience, while also mentoring an honours student. Her MSc journey combined fieldwork on smallholder farms with UAV-based remote sensing. She now continues her research as a PhD candidate at SAEON, in collaboration with STFC RAL Space in the UK. Lastly, Ms Yacoob thanked supervisors, Dr. Shaeden Gokool, Prof. Alistair Clulow, and Dr. Maqsooda Mahomed for their mentorship, guidance, and support.