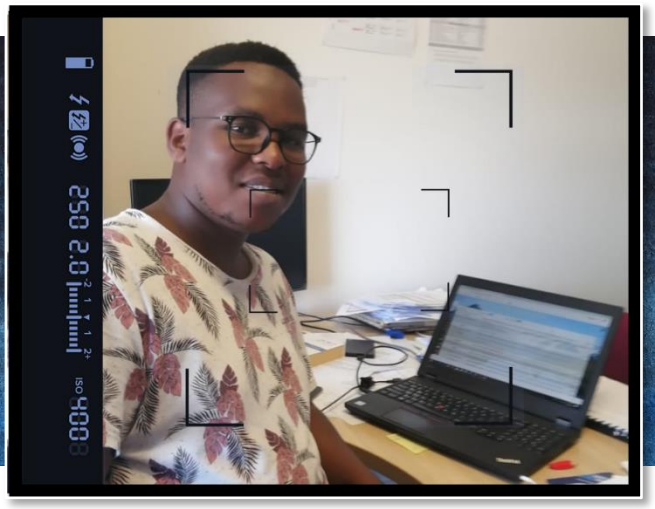
STUDENT FEATURE

Siyamthanda Gxokwe

Developing an integrated remote sensing framework for wetlands detection and monitoring within the Limpopo Transboundary River Basin



Siyamthanda is enrolled for a Doctor of Philosophy Degree in Environmental and Water Science at the Department of Earth Science, University of the Western Cape, South Africa. His thesis title is "Developing an integrated remote sensing framework for wetlands detection and monitoring within the Limpopo Transboundary River Basin".

What contribution Siyamthanda wants to make with his study?

Siyamthanda's PhD research is aimed at developing an integrated remotely sensed framework for wetlands detection and monitoring. To achieve the main aim, the study has four objectives:

- Objective 1 focuses on characterising wetlands and the expected outcomes from this objective are distribution of these co-existing wetlands, types, and characteristics (Soils, Nature, Vegetation communities, degradation and Hydrology).
- Objective 2: focuses on assessing the spatio-temporal variability of the co-existing wetland types with the focus on Extent, Inundation and Vegetation cover. The expected outcomes from objective 2 are the wetlands extent, veg. cover & inundation pattern, for the selected wetland types.
- Objective 3 seeks establishing the land use land cover changes (LULC) impacts on the selected wetlands health and condition in the area. The expected outcomes from objective 3 are LULC impacts on the wetlands health, condition on the selected wetlands systems (in terms of wetland area, structural and functional degradation).
- Objective 4 focuses on producing a synthesized remote sensing framework for detecting and monitoring wetlands in the area. The expected outcome from this objective is a synthesised remote sensing framework taking into consideration wetlands characteristics, variations in wetlands dynamics, degradation rates analysis based on remotely sensed data.

Research motivation and contribution to science

Semi-arid and arid environments are characterised by small seasonal wetlands, with 30% of these systems given the priority protection status. For the remainder, their status is being overlooked and not monitored, even though most of these systems offer the same ecological services as the monitored wetlands.

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There is therefore a need to monitor these systems to prevent the loss of ecosystem services that they offer.

Traditional field monitoring of small seasonal wetlands presents some challenges linked to the availability of funds, time and accessibility. Remote sensing approaches offer an opportunity to monitor these systems in a spatial and explicit manner with input data from various satellite sensors such as multispectral and hyperspectral sensors.

However, small seasonal wetlands are not easily detected in commonly used freely available multispectral sensors, and the high-resolution hyperspectral images are costly, making it difficult to consistently monitor these systems from high-resolution images.

With his study, Siyamthanda therefore seeks to develop a framework utilising freely available remote sensing information on wetlands in the Limpopo Transboundary Basin, to develop a framework that will improve the detection and monitoring of the status of all wetlands in semi-arid and arid areas, ranging from small to large, as well as phemeral and ephemeral systems.