

WATER SECURITY

Measuring the liquidity of the SA Bank of Water

Researchers are developing a new web-based application to estimate and summarise the volumes of water available in South Africa on a national and local scale. Sounds simple, right? Not so fast, writes Tony Carnie.



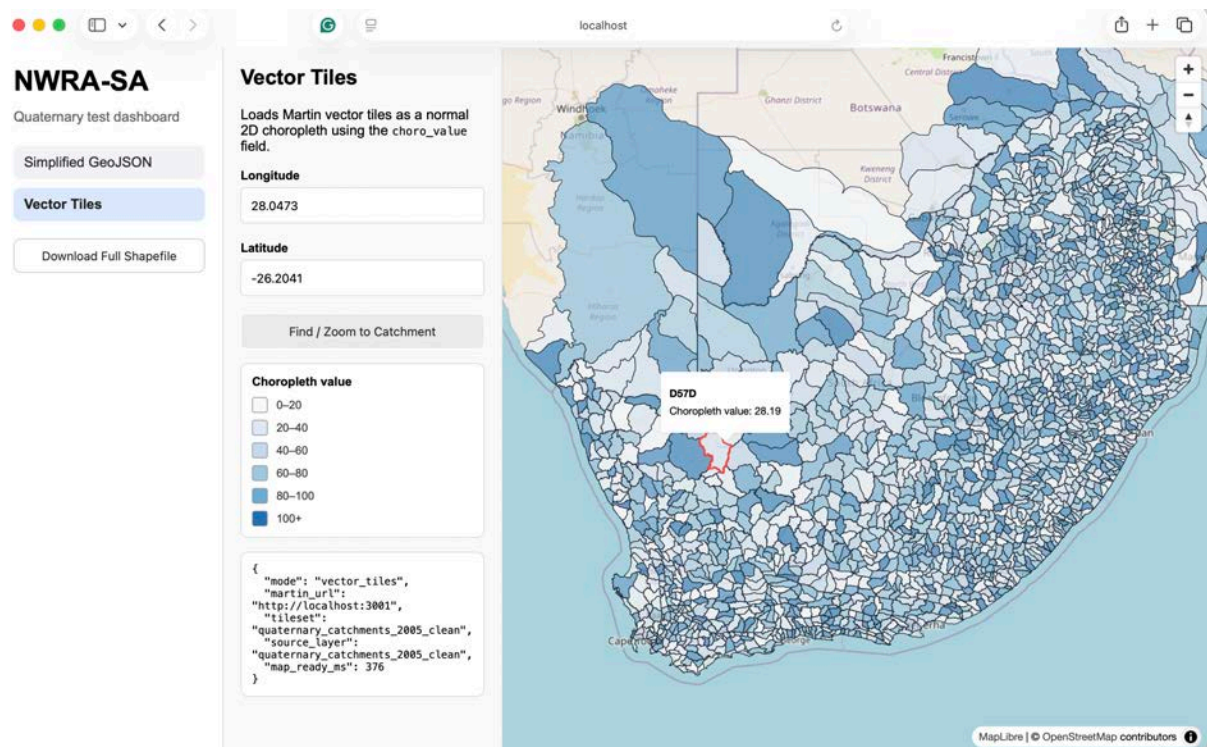
A business accounting system is an organised framework to record and analyse financial transactions. It tracks income, expenses, assets and liabilities to produce regular statements on the financial health of business and banking groups across the world. In much the same way, says research project leader Dr Stefanie Schütte, the proposed South African (SA) water resources accounting system will help guide the wise use of one of South Africa's most crucial national assets.

Schütte, from the Centre for Water Resources Research (CWRR) at the University of KwaZulu-Natal (UKZN), has been commissioned by the Water Research Commission to lead a five-year research

project entitled 'Setting up an operational water resources accounting system for SA'. In very simple terms, the new accounting system aims to estimate the volumes of water coming 'in' versus the water going 'out' of the account.

Mainly, this will include the volume of precipitation (rain) in any given month compared to the volume going out due to flows going downstream, as well as total evaporation, and consumptive uses for the irrigation of crops, industrial and domestic use or loss.

Unfortunately, notes Dr Schütte, comprehensive rainfall and



The Water Research Commission is developing a new clickable, water resources accounting system. This early concept image of the new web-based application shows South Africa's 1 946 quaternary water catchments.

temperature records are no longer available at no cost due to financial cutbacks from the fiscus to the SA Weather Services (SAWS). As an alternative, the new accounting system will rely largely on remotely sensed climate datasets rather than physical (observation) methods.

Along with Dr David Clark, Schütte and her CWRR colleagues have already conducted considerable research on water accounting over the last several years, based largely on hydrological modelling of flows. In a previous collaboration with Statistics South Africa (Stats SA) and the South African National Biodiversity Institute (SANBI), the UKZN Centre for Water Resources Research produced a detailed set of experimental water resource accounts for three catchment areas in 2024.

These are for the Mooi and uMngeni Catchments (important water sources for Pietermaritzburg and eThekweni), and the Breede Catchment (an important water source for Cape Town).

Now Schütte and her colleagues are extending the scope of the work to cover more than 5 000 altitudinal zones nationwide in order to report on water availability in the country's 1 946 quaternary catchments. Where possible, this will also include groundwater-surface water interactions, as well as engineered water flows (e.g., inter-basin transfers, dam releases, water abstractions and releases), where the information is available.

The team also hopes to make use of water quality data collected by the national Department of Water and Sanitation (DWS), including the Green Drop, Blue Drop and No Drop reports. "We will be very much dependent on information from the DWS and other institutions and we will also partner with the SAWS to get some of their data . . . but we are not trying to reinvent the

wheel."

However, the research team hopes to make water information more visible and accessible to a wide range of users and decision-makers via an updateable, web-based application. This will allow users to click on a particular area to see what the account is for that area. "We still don't really know how much water we have exactly, although we have a lot of desktop information," says Schütte.

She concedes that the initial national water accounting estimates are very unlikely to be 100% accurate – or even 90% accurate – but suggests that an imperfect start is better than not starting at all. There are several reasons for this, including the scarcity of comprehensive data (many rivers do not have measuring gauges, for example). The existing weather and climate observation network has also declined, and there is still limited information on water use, abstraction and return flows.

WRC research manager, Wandile Nomqophu, has emphasised the strategic importance of this project in a water-scarce country like South Africa. The combination of semi-arid conditions, high variability in rainfall, significant inter-basin water transfers and growing demand from several sectors creates a complex water management environment. "In this context, the need for consistent, integrated, and decision-relevant water accounting systems is both urgent and non-negotiable," he says, noting that water accounting must go beyond isolated datasets and sectoral analyses.

"It must provide a coherent framework that links hydrological processes with economic use and institutional governance." Specifically, he hopes the project will lead to:

Image: Supplied



Research project leader, *Dr Stefanie Schütte.*

- improved quantification of stocks and flows across surface water, groundwater, water quality and return flows,
- better attribution of water use by different sectors, including agriculture, industry, and municipalities,
- integrating ecological water requirements into national accounting systems,
- greater transparency and comparability of water data to aid policy and planning.

But there are huge technical challenges ahead, Nomqphu notes, including the current fragmentation in data ownership as well problems with data availability and resolution. “We see this project as an opportunity to build a foundation for long-term, systematised water accounting in South Africa. If we get this right, we are not just improving datasets – we are strengthening how South Africa makes water decisions.

“No single discipline or institution can do this alone. The strength of this project is in this platform – in the collective expertise, the willingness to engage, and the shared commitment to getting it right. This is just the starting point. What we build from here has the potential to become a lasting national system, not a once-off exercise,” he concludes.

The CWRR, set up in 2012, is the project leader and has expertise in both hydrological modelling and water resource accounting. Other partners include the SAWS, which will contribute to bias-correction of remotely sensed climate datasets using around 250 observed climate stations.

The SA Environmental Observation Network (SAEON) has expertise in data management and visualisation of water resource accounting through online user interfaces; while the Agricultural Research Council (ARC) will explore synergies with

Image: Supplied



Water Research Commission research manager, *Wandile Nomqphu.*

the WRC’s Water Research Observatory Data Portal.

The DWS will be involved in providing data and guidance on procedures for accessing data for the whole country, and North-West University will be providing expert knowledge on groundwater.

The project team is made up of Dr Stefanie Schütte, Richard Kunz, Dr Shaeden Gokool, Dr Maqsooda Mahomed, Dr David Clark, Prof Jeff Smithers, Mark Horan, Tinisha Chetty, Marsha Chetty, Prof Emer Roland Schulze, Prof Seifu Kebede Gurmessa, Prof Alistair Clulow, Prof Andries Kruger, Dr Michael van der Laan, Dr Marc Pienaar, Samukelo Jiyane, Lindsay Callaghan, Sandile Ngwenya and Sifiso Mbatha.



eThekweni Municipality

Contractors install new sections of piping to the eThekweni Southern Aqueduct in Durban.