UKZN Centre developing tomorrow's WATER RESOURCE CHAMPIONS

CWRR

Building a large enough skills base to deal with South Africa's water challenges – both now and in the future – remains a significant focus for the Water Research Commission (WRC), and one which it can only achieve with the assistance of academic partners. One of the most enduring and successful of these relationships is with the Centre for Water Resources Research (CWRR) at the University of KwaZulu-Natal (UKZN). Lani van Vuuren reports.

Global change and its impact on Africa's water resources is a critical concern. Africa is experiencing rapid changes in land use (such as urbanisation) with a corresponding degradation of its soil and water resources.

Change is a consequence of the continent's own economic development needs, as well as a strong demand from international role players' intent on securing land for future production of food, fuel, fibre and fodder. Whilst the imperative for development is clear, it is equally clear that Africa needs to develop its soil, land and water resources in a sustainable way and that this requires rigorous scientific input to inform policy, strong governance systems to ensure sound decision making and enhanced human capacity.

It is with the intention of providing the education and training of individuals and the technological advances to meet these challenges that the CWRR was established in 2012 out of a cohesive group of academics specialising in hydrology and water resources research since 1984. It is also since that time that the group has collaborated on WRC-funded research.

The Centre undertakes water-related research across a range of topics. Broadly, these are arranged as earth observation and hydrological process studies; model development and application (including design flood estimation); agricultural water use; global change and water resources (including land use and climate change) as well as water resources governance.

At the time of writing, the Centre was completing no less than seven research projects with funding from the WRC, with another seven underway. This is in addition to research projects being undertaken with funding from other institutions. All of these projects involve post-graduate students.

According to the Centre's Prof Graham Jewitt, who is also the Umgeni Water Chair of Water Resources Management, the academic programme in hydrology is the core feeder for CWRR's post-graduate programmes. "Over the past few years we have seen significant growth in numbers in this programme. For example, this year we have 14 Honours students, compared to only 9 in 2012 and only 6 in 2011. In turn, there are 40 students currently undertaking third year Hydrology compared to 35 last year, and the numbers are growing." Today, the Centre boasts

80 students in second year, compared to only 25 five years ago.

Over the past three years the Centre has also seen an increase in the number of students meeting Masters entrance requirements. "This year we are delighted that 9 of the 14 Honours students have progressed to Masters. They are joining another 35 students this year," notes Prof Jewitt.

The challenge of attracting good students to continue with post-graduate studies turned the Centre's attention to building skills within its own programmes, with efforts particularly focused at Honours students. Students are part of a broader research team, including the Honours students. In this way, students are able to interact with each other and share ideas. Having Honours students linked into a broader team of post-graduate students (from Masters to post-PhD) allows students to see the progression through the academic ranks, and also share in the enthusiasm generated by these students and their supervisors.

"The effort we have put into the Honours class also means that junior staff members who do not have PhDs yet can gain experience in research supervision – so the benefit works both ways," notes Prof Jewitt.

In addition, undergraduate students are encouraged to become 'vac students' – working on research projects during the longer vacations. Undergraduates are also exposed to the research through second- and third-year level field trips, which take them to several of the research study sites as well as get them into contact with research contract staff teaching their specialisation.

Building skills in the water sector has not come without its challenges. "As our student numbers have increased, we have seen a decline in student literacy and numeracy," reports Prof Jewitt. "This was probably worst about three years ago, but we are now seeing an improvement."

The Centre has identified literacy – particularly scientific writing – as a major shortcoming. As a result all Honours students now have a scientific writing course and a dedicated writing tutor who works with them throughout the year. This has made a huge difference; the standard of work submitted has substantially improved, and students who were scoring poorly because of their poor oral and written communication skills are now meeting the post-graduate entrance requirements.

Another challenge the Centre has had to overcome is its limited supervision capacity. The CWRR is fortunate to have a number of well qualified, contract staff among its members. These members are focused on the research projects which fund them, but also contribute to the undergraduate hydrology programme in their field of expertise and supervise students working in their projects.

According to Prof Jewitt, these members play an enormous role in supporting the Centre's teaching and research. "Without the support of the WRC and other funders, there is no way that we could sustain the levels of supervision needed for our current student numbers."

Another aspect which limits student progression is a lack of funding. Through the WRC projects they are involved in, students are assured that their research project will be adequately funded. However, the Centre also directly funds both their subsistence and research if they do not have another bursary.

This begins at Honours level, where the Centre pays tuition fee level bursaries and then to Masters and PhD level where the bursaries cover full living expenses. "UKZN offers a full fee remission for one year to full-time Masters students and three years for PhD students, which makes a big difference to the affordability of studying further," notes Prof Jewitt.

Prof Jewitt ends with the following advice for students considering a career in the water sector: "Study as far as you can while you are in the academic system. Very few part-time students complete their degrees, but most full-time ones do. It is incredibly difficult to complete a research degree while you have a full-time job."

WRC Research Manager, Wandile Nomquphu, comments on the importance of skills development, particularly in the field of hydrology: "Hydrology forms the basis for water resources management. Hydrologists monitor (by collecting data), manage and protect the water environment (through the interpretation and analysis of the data), and inform decision-making. The capacity of a country to manage its water resources is largely determined by its capability in hydrology, and this capability is a function of the ability of universities to train knowledgeable hydrologists."

Continues Nomquphu: "The function to academically train hydrologists resides with the universities that should be purposely supported financially to churn out these scientists consistently. Centres of excellence [such as the CWRR] have proven to be a sustainable mechanism through which to nurture competent hydrologists who keep the national capability at the cutting edge." ❑

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Third-year hydrology students undertaken practical work.