

# UP Water Experts Unite Under One Umbrella

***The University of Pretoria (UP) has created a united front in the form of its new Water Institute to tackle capacity and research problems towards more sustainable use of Africa's water resources. Lani van Vuuren reports.***

South Africa, and the continent, faces tremendous water challenges, not the least of which is a lack of skilled people to ensure sustainable access to clean water and safe sanitation to the millions that are still going without. Capacity building through research is a crucial building block not only for the supply of basic services, but also to ensure the sustainable use of water for growth and development.

UP has a well proven record in water research and education across several disciplines, and the tertiary institution has already contributed significantly towards building capacity in the sector. During the past

decade, more than 40 highly qualified internationally recognised researchers and their students completed many successful research projects related to water supply, sanitation and integrated water resource management, providing state-of-the-art technology to the water sector.

## STRENGTH IN NUMBERS

However, this research was historically undertaken largely in isolation within several faculties, creating the potential for duplication and gaps. Calls for a more cohesive and concerted level of organisation to give impetus to the university's water focus area led to the formation of the

UP Water Institute (UPWI). "By working together as a team, the university's water experts are able to meet the challenges with which they are faced in a more coordinated fashion than they would have been able to do individually," explains Prof Eugene Cloete, Head of the Department of Microbiology & Plant Pathology, who leads the institute.

The institute was officially opened in March in a ceremony attended by guests from at least ten countries. Prof Cloete says the UPWI has been welcomed by the international water community. "A coordinated research and education effort such as this has been lacking in the water sector, not

only in South Africa, but in Africa, as a whole in recent years.”

Apart from building further on existing relationships with organisations such as the Georgia Institute of Technology in Atlanta, in the US, the UPWI has received calls of interest from the International Water Association and the US National Academy of Science, among others. It also hopes to unite forces with other local institutions to tackle South African specific water challenges (already UP is a founding partner with CSIR of the Southern Education and Research Alliance or SERA, for example). The private sector has not been left out. “Industry is more than a client, it must play a crucial partnership role in finding answers to the country’s water challenges,” says Prof Cloete.

The UPWI’s network of water professionals brings together six faculties, including engineering, natural and agricultural sciences, law, human and health sciences, and veterinary science, covering all facets of the water cycle. The institute conducts research in five main areas, namely water and health, water treatment and supply systems, water agriculture and biodiversity, water flow in the environment, and water-related decision-making, policy and governance. “The institute’s strength lies in its multidisciplinary approach to water sector challenges, and the high degree of expertise among personnel,” reports Prof Cloete.

## WATER AND HEALTH

UPWI is conducting several research projects aimed at unravelling the links between water and health. These can be grouped into three main focus areas, namely waterborne bacteria (including bacteria pathogens and cyanobacteria), waterborne viruses, and endocrine disruptors (EDCs). Research projects include the development of low-cost water purification techniques, investigations into the potential effects of EDCs on animal

and human health, and developing improved techniques to recover viruses from environmental samples.

With regards to the latter, an important aspect of virological research at UP has been the application of molecular techniques to verify the reliability of cell culture identification procedures in the South African context. Research undertaken at the university offers the first comprehensive view of the virological quality of drinking water supplies in South Africa.

## WATER TREATMENT

Research undertaken through UPWI concerning water treatment and supply systems focuses on the purification of water, the disposal of wastewater and the transport and distribution of water to and from users.

With regards to water purification, research activities include seeking ways to control fouling in filters and membranes as well as the development of techniques to reduce high fluoride and nitrate in borehole water. Another aspect of research on water purification is identifying the chemicals responsible for health risks or unpleasant flavours and odours so that appropriate steps can be taken to remove or neutralise them. Improved methods for seawater desalination are also being developed.

In turn, wastewater management research includes investigations into the use of soil filters in reeds to filter wastewater from roadside filling stations and rest stops, as well as the development of an integrated passive system for the treatment of mine wastewater.

## WATER, AGRICULTURE AND BIODIVERSITY

Irrigation and agricultural use of groundwater are two important research areas for the UPWI. Human interference with watercourses

through, for example, pollution and the construction of dams and weirs, is a major factor responsible for the threat to biodiversity. Thus another research focus area is aimed at assessing and mitigating this impact.

## WATER FLOW AND THE ENVIRONMENT

A number of scientists affiliated with the UPWI are engaged in research on weather forecasting and climate change. A routine weather prediction system focusing on short-term forecasting has already been developed. Research also continues into predicting heavy rainfall from tropical weather systems to improve timely warning of floods.

Other projects include research on the movement of water in rivers and the evolution of river systems over time, as well as research on the characterisation of aquifer structures.

## WATER-RELATED DECISION-MAKING, POLICY AND GOVERNANCE

The UPWI hosts a number of research initiatives concerned with water-related decision-making, policy and governance. There are three main focus areas, namely environmental, economic and social linkages; policy and legislation; and capacity building and dispute resolution.

“With the establishment of the UPWI will come a lasting mechanism for the continuous development of technical professionals, facilitated by the provision of valuable services, the generation of new knowledge through research and the creation of human resources needed for government agencies, regional and national water resource centres, industry and academia,” notes Prof Cloete. “This institute has the potential to be a leading research and education organisation, and a real asset to South Africa.”

