

WATER PERSONALITY

Roland Schulze – A lifetime dedicated to water

Tony Carnie

Prof Roland Schulze pioneered South Africa's first university degree course in hydrology and is renowned internationally for his research on climate change and water conservation. Schulze, who has also supervised and mentored several generations of young water researchers at the University of KwaZulu-Natal, reflects on some of the highlights of a distinguished career spanning more than five decades. Article by Tony Carnie.



Growing up in the village of Harburg in the KwaZulu-Natal Midlands, Roland Schulze attended a very intimate little school. There were only 26 pupils in the whole school, spread through from Grade 1 – 8. Young Roland was always first in his class, though he is quick to point out that there was only one other boy in class – the son of the local dipping inspector, who always came second.

“We had one teacher for four classes, but they were very progressive and often we would have lessons under the trees, where we would build models of the local landscape or listen to Mozart for music appreciation.”

As his Matric year drew closer, Schulze moved to the Hermannsburg Deutsche Schule to complete the last four years of high school. Hermannsburg, the oldest private school in the province, was established in 1856 to educate the children of Lutheran Church missionaries, many of whom would settle in nearby villages, such as Wartburg, Harburg or New Hanover (Neu-Hannover).

Though Schulze still has one of those delightfully old-school Natal colonial accents, his heritage is unmistakably Lutheran, and the family speak German as their first language at home. “Both my parents were born in South Africa, with my mother’s side of the family arriving in the 1880s and my father’s side in the 1890s.



Roland Schulze, Emeritus Professor of Hydrology at the University of KwaZulu-Natal.

"My parents grew up during the Great Depression, and had to leave school at age 14 to start working, but we had a very loving home. My mom later also had to go out to work so that I could go to high school and university, where I studied physical geography and chemistry at the then University of Natal.

After completing his MSc degree Schulze started lecturing physical geography at the Pietermaritzburg campus in 1969. Five decades later, though formally retired, Schulze remains on campus as Emeritus Professor of Hydrology in the Centre for Water Resources Research, within the School of Agricultural, Earth and Environmental Sciences.

"My wife, Waltraut, has also been very supportive. We have been married 52 years and, in a way, she gave up her career for mine. We have been blessed with two children and seven grandchildren."

Schulze, now 77, says he has developed a life philosophy similar to that of a rugby centre: "You need to spot the gap and to take that gap. You also need to know when to take the ball and run, and when to pass it. On defence, you need to work out when to attack from the front, or from the side."

A number of events shaped his career path. In 1969, for example, he was inspired to study more about water after reading Prof Roy Ward's book, *Principles of Hydrology*.

"Schulze has published more than 140 refereed journal papers, more than 100 consulting reports and personally supervised nearly 90 MSc or PhD students."

The then recently-established Water Research Commission in the early 1970s also played a significant role by providing financial support to Schulze for a new project on small water catchments. This opened the way for several other research projects on a larger scale.

"From those small beginnings in local catchments I started out as a one-person operation. Eventually, we expanded to now include seven full-time hydrology staff, several PhDs and part-time lecturers."

Schulze was also responsible for initiating proposals to offer a specialist hydrology degree at the University of Natal – the first university in the country to offer this degree.

He also played a central role in developing the ACRU (Agricultural Catchments Research Unit) Model, a multi-purpose water modelling system which has since been used for land use impact studies in many parts of South Africa as well as in Zimbabwe, Eritrea, New Zealand, Chile, the USA and Canada.

The same model has also been adapted to model the potential impact of elevated CO₂ and temperature levels and to study shifts in water resources and maize production in southern Africa due to global climate change.

Schulze remains very concerned about current water consumption patterns in a water-scarce nation. "My vision for the water industry in general is that we become more efficient in the use of water, particularly in light of population increases and climate change, which might cause us to have less water than we are used to in the future.

"More than 60% of our water is used for irrigation, so we have to become much more efficient. If irrigation agriculture were to become just 20% more efficient, we could immediately save 12% of our national water resources.

"The second major area of concern is the volume of leakage from municipalities. Maintenance is a word we really have to relearn to reduce the volume of water losses we are seeing."

His third major concern is the loss of available water resources from sewage pollution. Schulze says this level of pollution cannot be allowed to continue, but it seemed that several municipalities only react when a crisis develops.

"We also need more technical expertise in the Department of Water and Sanitation. Many of our well-qualified people are no longer in the country. We simply can't afford to lose such people.

Water personality

I think in appointing technical staff we need to get beyond the rhetoric of the mid-1990s."

Schulze believes correct water pricing is essential to promote wiser user of water.

"As it becomes more expensive you will use it more sparingly. But you have to be clever about pricing – it cannot just be punitive. There has to be a balance between charging a fair rate and incentivising users. So, if you have been good, you should get some benefit," he states.

While much of Schulze's career has revolved around water, his focus started to shift increasingly towards climate change in the late 1980s when he was invited to a meeting in Swaziland by Prof Peter Tyson from the University of the Witwatersrand's Climatology Research Group.

Schulze acknowledges that there are still several uncertainties associated with climate modelling at a downscaled level, yet a wide range of general circulation models around the world are projecting very similar trajectories, especially with regards to increased temperature and water evaporation.

"The country has been divided into nearly 6 000 quinary catchments for which we have 50 years of historical daily climate data for each of these sub catchments and we use these as a baseline for climate change models.

"Climate change has opened a lot of doors for me because it was still a new discipline in the early 1990s. At that time there were still very few South African experts."

In addition to his research into climate change Schulze is currently working with the fruit, macadamia and sugar industries. He believes some industries are taking a really hard look at themselves in terms of climate impacts and he thinks that clever industries will respond by changing how they do things, where they do things and when they do things in the coming decades.

Does he believe governments, industry and other stakeholders are moving fast enough to avoid dangerous levels of climate change?

"I believe Europe and South Africa have both recognised the seriousness of the problem, though there is one major player to the west of Europe who has yet to be convinced. Fortunately, his scientists are still doing some good work in this field"

Schulze says he favours a solutions-based approach to the climate change debate, rather than a doomsday view.

On a personal note, he says he is often asked about the best piece of advice he ever received. "It happened in America shortly after I turned 58. I was working with Prof Pete Hawkins of the University of Arizona.

"Pete asked me how old I was, and remarked that the years between 60 and 65 should be the best time in anyone's life. His advice was that people should aim as far as possible to do only what they really liked to do at this period of their lives.

"So, on the plane back to South Africa, I started to make a list of things I no longer wanted to do. Over the next two years I gradually started to tick them off my list and, by the time I was 60, I had managed to free myself of most of the things I did not like doing at work.

"I still see people slaving away at things they dislike – but we need to remember that we only have this life once."

Though he admits that his time-management skills could be better, his advice is to focus on one issue at a time, and to isolate yourself where possible to improve your concentration. "There is a difference between being a manager and a leader. I have always seen myself as a leader who likes to think and to ponder, rather than someone who simply ticks boxes."

Schulze lists some of the highlights of his career as being inducted as a member of the Academy of Science of South Africa in 2009 and being appointed a Fellow of the University of Natal in 1991 in recognition of distinguished academic achievement.

In 2013, he was also voted South Africa's top water researcher following a nationwide survey. The cherry on the top came in

Courtesy Roland Schulze



Schulze, with wife Waltraut, after receiving a Lifetime Achievement Award, Cape Town 2018.



Schulze delivers his acceptance speech after receiving a Lifetime Achievement Award in Cape Town in 2018.

Courtesy Roland Schulze



Schulze is a popular speaker at water-related events.

2018 when he was awarded a Lifetime Achievement Award at the African Utilities Industry Awards for his achievements at a continental level.

He has also published more than 140 refereed journal papers, more than 100 consulting reports and personally supervised nearly 90 MSc and PhD students. "If you have a happy life at home, your work life is more likely to be positive and I think I have had a very fulfilled professional and personal life.

"I was lucky enough to have tremendous opportunities to travel abroad – about 176 times, the last time I counted."

Apart from numerous trips as part of his work with the United Nations' Intergovernmental Panel on Climate Change, Schulze also took full advantage of UKZN's facility for a six-month sabbatical every five years. "I spent excellent time at universities in England, the United States and Europe and our children were also able to experience going to school in very different environments.

"I still see colleagues making excuses not to go on sabbaticals by saying their wife has a good job or that they don't want to disrupt their children's education, but from my perspective I have always made very good use of these opportunities to the benefit of my research. They were excellent."

Outside of work, he was a warden of Lutheran Church for 11 years, attends church regularly and does not see any conflict between religion and science. "There are no problem areas for me whatsoever. The Bible was written more than two thousand years ago, when people had to think in much simpler terms. But the essential messages remain the same, such as: Love your neighbour."

Schulze retired just over a decade ago when he reached 65, but is still an Emeritus Professor at UKZN, and is also engaged in projects with Stellenbosch University, the WRC, eThekweni Municipality, the Western Cape provincial government and a number of agricultural industry groups.

"I am still helping people at UKZN with their projects and sometimes feel a bit like the departmental psychologist, but I really enjoy the collegiality of sharing a cup of coffee with fellow academics.

"My approach to retirement has always been that the work must look for me, and not me looking for the work – and I'm afraid that it keeps finding me!"

Some of the pertinent reports Roland Schulze authored or co-authored for the Water Research Commission

- Modelling impacts of climate change on selected South African crop farming systems (WRC report no. 1882/1/16)
- Developing water-related climate change adaptation options to support implementation of policy and strategies for 'Water for Growth and Development' (WRC report no. 1965/1/15)
- An evaluation of the sensitivity of socio-economic activities to climate change in climatically divergent South African catchments (WRC report no. 1843/1/12)
- Handbook on adaptive management strategies and options for the water sector in South Africa under climate change (WRC report no. 1843/2/12)
- A 2011 perspective on climate change and the South African water sector (WRC report no. TT 518/12)
- Development and applications of rainfall forecasts for agriculturally-related decision-making in selected catchments of South Africa (WRC report no. TT 538/12)
- Delineating river network quinary catchments for South Africa and allocating associated daily hydrological information (WRC report no. 2020/1/12)
- Climate change and water resources in southern Africa. Studies on scenarios, impact, vulnerabilities and adaptation (WRC report no. 1430/1/05)
- Development and evaluation of an installed hydrological modelling system (WRC report no. 1155/1/04)
- Modelling the impacts of land cover and land management practices on stream flow reduction (WRC report no. 1015/1/03)
- Estimation of streamflow reductions resulting from commercial afforestation in South Africa (WRC report no. TT 173/02)
- Development of a distributed hydrological modelling system to assist in managing the ecological reserve to the Sabie River system within the Kruger National Park (WRC report no. 884/1/01)
- Design rainfall and flood estimation in South Africa (WRC report no. 1060/1/01)
- Long duration design rainfall estimates for South Africa (WRC report no. 811/1/00)
- Impacts of sugarcane production and changing land use on catchment hydrology (WRC report no. 419/1/98)
- Hydrology and water quality of the Mgeni catchment (WRC report no. TT 87/97)
- Distributed hydrological modelling system for the Mgeni catchment (WRC report no. 234/1/92)
- Crop water requirements, deficits and water yield for irrigation planning in southern Africa (WRC report no. 118/1/88)