

Women in water

The science of women in wetlands

A new generation of scientists is contributing to our understanding and appreciation of wetlands. The Water Wheel spoke to some of the female researchers working on the frontiers of research in this field.

In ancient times, some cultures brought ritual offerings to wetlands to show their appreciation and marvel. Today, a new generation of wetland believers bring their valuable knowledge to many forums to help protect and manage these water resources.

Water is life and wetlands are an integral part of that cycle, they believe.

While remarkably resilient in many ways, wetlands are vulnerable to a range of direct, indirect and cumulative impacts. Studies in several major catchments in South Africa reveal that between 35% and 60% of wetlands have been lost or severely degraded.



People should, therefore, care about wetlands because of water, **Dr Althea Grundling** emphasises. Dr Grundling, a senior wetland researcher at the Agricultural Research Council's Institute for Soil, Climate and Water (ARC-ISCW) Water Science Programme, is one of the researchers who are improving our understanding of wetlands and their management. She holds a doctoral degree in Geography from the University of Waterloo in Canada.

Dr Grundling explains, "Wetlands are natural features in the landscape that offer many advantages such as biodiversity, wildlife and fish habitat, winter pasture, erosion control, open

space and aesthetics but most important: water storage, even in the midst of severe droughts."

Dr Grundling, a UNISA Research Fellow and a member of the International Mire Conservation Group, says she has never looked back since venturing into this field. "I did not choose wetland research; it chose me," she says. "It is complex, yet logical and I see the importance of healthy wetlands to improve people's lives. There are ample opportunities for women to grow in wetland-related professions."

The impact of her work includes understanding the wetland processes on the Maputaland Coastal Plain, to unravel and unpack the hydrology links within this sensitive primary aquifer. "Research studies like these not only support the wetlands strategy of the ARC's Water Science Programme but it also actively involves students, whom I mentor and support. An important part of my work is to publish and present research findings, establish collaboration and partnership with universities, organisations, municipalities, national departments alongside regional roleplayers and small-scale subsistence farmers."

The single biggest change needed to improve the state of wetlands is to change human behaviour and perceptions, she believes. This can be done through awareness raising and education. "One should understand how to relate to water and wetland environments," she notes. "If you change the hydrology of a wetland, for example through draining, ploughing or over-grazing, that can result in erosion. If you alter the hydrology of the catchment by various land use practices including mining, agriculture, urbanisation and plantations, it changes the state of the wetland. We need to understand and explain the flow paths of water in the landscape and how the wetlands depend on them."

Dr Lulu Van Rooyen (Pretorius), a Post-Doctoral Research Fellow at the University of KwaZulu-Natal (UKZN), shares Dr Grundling's passion for wetlands and particularly peatlands. Dr Pretorius has been involved in research on the Maputaland Coastal Plain, which has improved our understanding of the

peatlands of north-eastern KwaZulu-Natal. Her work has also contributed to current knowledge of wetland delineation on sandy coastal aquifers.



Says Dr Pretorius, "This is an exciting time to be part of such a multifaceted and evolving field of research. All women have the power to make considerable contributions in their surroundings - not only in terms of wetlands, but towards any form of best practice and ecological, social, and economic responsibility."

Dr Pretorius holds a doctoral degree in Environmental Management from UNISA. What prompted her decision to follow this career path? "I was actually going to study a BMus degree. But I have always been fascinated with the forces of nature and the way things are connected ecologically, especially within our aquatic systems. I find the tranquillity of being outdoors a very personal and grounding experience – a place where I can meet with God and His creation."

Dr Pretorius loves tramping around in wetlands in her gumboots. "I love discovering them and putting the 'puzzle' of topography, geology, hydrology, soil, organisms, and wetland use together. I love the dynamic nature and inter-connectedness of wetland systems in the landscape. It forces the research and researchers to be dynamic and inter-connected as well!"

Currently, Dr Pretorius has a two-year post-doctoral position with the UKZN, funded by the eThekweni Municipality. She is developing a long-term ecological monitoring plan which will be used to understand the impacts caused by anthropological and climate change pressures. "Wetlands are the kidneys of our environment," she states. "It is one of the biggest units in our ecological infrastructure, and we gain more value from them than most people realise."

Dr Heidi van Deventer, a senior researcher in the CSIR's Earth Observation Research Group of the Natural Resources and Environment Unit, agrees. "We need to view ourselves as part of nature, not separate from it, and not ruling it."

Dr Van Deventer holds a doctoral degree in Geography from the UKZN. Her work combines geographical information systems (GIS) and earth observation or remote sensing for understanding and monitoring wetland ecosystems.



Dr Van Deventer has been leading the freshwater component of the National Biodiversity Assessment for 2018. She has also been involved in the development and use of remote sensing indices for monitoring of wetland vegetation and other freshwater essential biodiversity variables. Currently, she is leading the WRC-funded project that investigates the capability of earth observation in mapping and monitoring wetland vegetation to be completed by March 2020.

Hiking through the iSimangaliso Wetland Park as a teenager gripped her attention about wetlands. "The fact that it was wild and inaccessible humbled my sense of humans' position in nature. Perhaps what fascinates me most of wetlands is that it restricts our ease of movement in the landscape and, because it is difficult to access all parts of a wetland, one would need some level of earth observation to be able to see and understand it."



Yonwaba Atyosi, an MSc student at the University of Fort Hare, has also been using remote sensing in her work. She employs multi-temporal assessment of spatial changes in the distribution of estuary vegetation.

Atyosi is a Professional Development Program student at the ARC-ISCW under its Water Science Programme. She is focusing on the relationships between wetland types, geology, hydrology and geomorphology. "People are not aware of their functions and importance," she points out. "Wetland education is key." "With our country threatened by droughts, I felt a need to do water-related research to fill in gaps in knowledge of this field while using GIS and remote sensing which I am very passionate about."



A lot of wetland research has now become interdisciplinary. **Zikhona Gqalaqha** has, for instance, been identifying wetland properties conducive for the development of Rift Valley Fever.

She is an agriculture student at the University of Free State (UFS) and is also part of the ARC's Professional Development Programme in its Water Science Programme.

Her work explores the interface between wetland research and agricultural sciences. The aim is to understand the spread of the Rift Valley Fever virus in Africa. Her work will assist decision-makers on how to treat this disease without destroying wetlands. "We are hoping to find out if the virus causing this disease hibernates in the soil," she explains. "My role is to identify wetland soil properties that are conducive to the development and survival of the virus."

Many things influenced her decision to follow this career path. "By studying soil science, I was introduced to the characteristics and importance of wetlands. I realised that by studying and understanding wetlands, I could possibly bring a solution to the water scarcity problem back home (in the Eastern Cape). In the past, we used to collect fresh drinking water in the wetland and irrigation water for crops in the villages. People went the extra mile utilising wetland vegetation to make brooms, hats and mats to sell and make a living. Even today, the wetland in my village still provides clean water for the community."

"There is a link between the environment, ecology, agriculture, conservation science, climate science and human health (termed 'One Health'). One can therefore not address human health while ignoring the ecosystem's health."



Understanding wetland systems are key to make informed decisions about them, according to **Lizette Delport**. She works as an in-house wetland specialist for an environmental consulting company.

Says Delport, "Water is the essential element for all survival, and I wanted to be a part of protecting such a valuable resource." Delport recently completed her MSc in Aquatic Health at the University of Johannesburg.

Her work includes functional assessments of wetlands, rehabilitation and monitoring. "There are many developers that need to understand the importance of protecting wetlands during construction and operation. We aim to inform them of wetlands on site during the first steps of planning so they can make the necessary changes to the layout."



Kate Snaddon, an ecological consultant at the Freshwater Consulting Group, is also furthering our understanding of the fragility and resilience of inland aquatic systems. Snaddon is the non-executive Director of the Freshwater Research Centre, and Chair and Founding Member of the South African Wetland Society.

Snaddon, who obtained an MSc degree in Freshwater Ecology from the University of Cape Town, is involved in the mapping and describing of wetlands and rivers.

Says Snaddon, "I believe that we need to focus our undivided attention on the aquatic ecosystems that sustain our planet. We need to respect the connectivity between ecosystems, and between humans and ecosystems."



The link between water, life and clean water is clear. Yet there is no magic solution to improving the state of our wetlands. This is the view of **Nancy Job**, a GreenMatter Postgraduate Fellow and PhD student at the UFS.

Says Job, "We should continue to grow our field of practice, to welcome new energy and solutions. There is not enough investment in and encouragement of people, including those within the government who are mandated to take forward the conservation of our wetlands."

Job got her first job as a wetland consultant in 2000 in the USA. She has since then worked as a wetland consultant, identifying and delineating wetlands and assessing the potential impacts of proposed change in land use. For the last ten years, her research has focused on wetland inventory and conservation planning. This includes being a part-time associate of the WWF Mondi Wetlands Programme, a wetland conservation NGO.

What prompted her to follow her current career path? Says Job, "The encouragement of a friend led me to an adventure – I volunteered in the Pacific Northwest (Canada) as a technical field assistant to a PhD student studying the effects of logging of 100+-year-old ('old growth') trees on a specific frog species which spends roughly five years of its' life cycle in mountain streams. I loved the work and followed up with more hard work and volunteering to further develop my skills.

"It was a combination of taking the initiative to create opportunities for myself, the luck of having doors open, the generosity of great mentors, helped in part by my enthusiasm to learn more about this fascinating field which I had 'discovered'. Out of this came a good set of references, securing me a place in the year-long Wetland Science and Management postgraduate diploma at Washington State University, which accepts only a small number of applicants based on the submittal of motivation for why they should select you. This is how I changed careers, and I haven't looked back!"

Her current work includes investigating the impact of hillslope hydrological processes on wetland form and function. She is also doing preparations (in French) for the development of a national wetland management plan for Rwanda.

Job remains committed to lifelong learning about wetlands. "I guess I am driven to keep learning – I am also in my second year of a PhD investigating the role of hillslope hydrology in driving the hydrology of certain wetlands and highlighting the source areas. This is partly funded by the WRC."

She loves being out in the field, augering for soil samples. "I love the detective work of figuring out how the wetland works, and the understanding that is revealed by looking beneath the soil surface." One of her favourite wetlands remains the Goukou wetland, where she did her Masters research thesis. "It is a very beautiful peat wetland, fascinating in that it took thousands of years to accumulate," she says.

What has been her greatest achievement to date? "I'm proud of my collaborations with CapeNature, SANParks and SANBI in ground-truthing and inventory of wetlands."

Her message to inspire other women in this field? "Keep going; we need you! Create your opportunities. I don't think there are any shortcuts to avoid the necessary hard work and determination, but don't forget to lend a hand to your colleagues, they'll reward you in turn with advice and encouragement."



Antoinette Bootsma is another female scientist with a fascination in wetlands. Bootsma, a consultant at Limosella Consulting (Pty) Ltd, wants to get a better understanding of wetland ecohydrology. This is to inform management recommendations and rehabilitation. "Wetlands tie in aquatic ecosystems with vegetation ecology which were the two things I wanted to explore as career options," she says. "I am passionate about natural processes at a landscape level. I think I have always had this passion, even as a child. Wetland ecohydrology is just a perfect fit for me."

Bootsma, who recently completed her Masters thesis, assessed wetlands as part of the environmental authorisation process. She was tasked with the first audit of wetlands in the City of Johannesburg in 2008. "This was a spatial layer identifying where wetlands were expected to occur in this municipality so that various processes in development planning could be aligned. This layer has since been refined, and other municipalities have developed their own layers. I feel that the body of work of which my project contributed to planning to ensure the continued function of wetlands in these urban areas."

Wetlands are valuable assets, both in terms of the hydrological and biodiversity functions they provide, but also as aesthetic components of our urban landscape. She points out, "If developers and municipalities could work together to incorporate functional wetlands into development layouts, rather than see them as complete no-go areas or areas to be built on, we could improve the quality of our human habitat so much. It is a mindset change that is desperately needed.

Bootsma concludes, "There is a lot of intuition, grace and discipline that women can bring to this field. For me, an understanding of wetlands is very intuitive. It's a gut thing. And that is something women are very good at."