

AMAKHOSAZANA AMANZI


Celebrating our women in water and sanitation



water & sanitation

Department:
Water and Sanitation
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FOREWORD BY THE MINISTER OF WATER AND SANITATION

The national Women in Water and Sanitation Consultative Conference takes place in August. The month of August is designated as National Women's Month, with 9th August being National Women's Day. The day is a celebration of the fierce battles that the women of our country fought against apartheid tyranny and bigotry, especially, the triple oppression experienced by women. Today, women still have to deal with the challenges of patriarchy that to this day bedevil our society, as a whole.

Mothers, grandmothers, sisters, daughters. We have all known women that have inspired us. Women that were not content to rest in their fate. Women who did not accept their marginalisation but rather chose to fight, to light a path for us all. We owe it to them now to be all that they have inspired us to be. We dare not be anything less than phenomenal, lest we tarnish their memory and destroy the foundations that they have built for us.

South Africa is a vastly different place than the one inhabited by our mothers and grandmothers. Since 1994 various legislation and policies have been crafted and implemented that address the issues of women economic empowerment, gender inequality and equity in South Africa. In terms of closing the gender gap, South Africa is among the top 20 countries measured by the World Economic Forum's Global Gender Gap Report that demonstrates increasing equality between men and women. Thus, the platform has been set in South Africa for every woman to rise and be magnificent; to take her rightful place as an equal alongside men.

We understand that for water management to be democratic and transparent – and represent the needs of all people – both men and women must have an equal say. As the traditional custodians of water, there are abundant opportunities for women in the water sector. Today we accept that a woman can be a water manager, a farmer, an engineer, a hydrologist, a microbiologist.

It was former South African President, Nelson Mandela, who said that: "Education is the most powerful weapon which you can use to change the world." As the following pages will show there are many South African women from different walks of life who have chosen to dismiss the stereotype. Women who have educated themselves, and used every resource and tool to their disposal to break through the glass ceiling and rise to the top of their sector. There are also those women who chose not to just be successful in themselves but to strive for the dignity and development of their communities. We salute both these builders and nurturers of our nation.

To all young women out there, we have created the opportunity, it is up to you to take it!

Nomvula Mokonyane



PREFACE BY THE DEPUTY MINISTER OF WATER AND SANITATION

It is well accepted that water is key to peace and stability and central in providing a powerful multifaceted contribution in the context of sustainable development and poverty eradication. South Africa's freshwater resources can only be successfully managed if men and women have an equal voice in controlling the sustainable use of water resources and sharing the benefits.

The Department of Water and Sanitation takes the issue of gender mainstreaming very seriously. This means creating a safe, enabling environment in the water and sanitation services sector for women and men to participate equally in realising their full potential, and to put in place mechanisms to facilitate equal access to resources and opportunities in a fair and just manner at all levels.

Emphasis is placed on the full participation of women, youth, the physically challenged and the voiceless poor male, in equal and active decision-making and service delivery, so that effective sustainable social and economic empowerment can take place.

Issues of water affect women and men differently. Women and girl children are affected in a sense that traditionally they take care of their families and are therefore more likely to fetch water. The Department of Water and Sanitation as the authority regulating water provision in the country, has as its central concern access to water and sanitation for all women of South Africa. In the first two decades of South Africa's democracy, we have witnessed first-hand the difference service delivery can make in the lives of especially women.

But gender mainstreaming does not stop with water and sanitation provision. It also extends to the management of these services. Women and men bring different perspectives and viewpoints to water management, and play different roles. There are, however, often considerable imbalances between women and men, in for instance their levels of education and the influence they are able to exercise, and these imbalances must be addressed in initiatives to capacitate the two groups to participate in decision-making.

As the traditional custodians of water resources, women must be leaders in the development, implementation and monitoring of initiatives and solutions. Over the next few pages we celebrate those women, who have stepped up to the challenge of taking a leading role in the water sector, not only for the benefits of themselves and their communities, but for generations to come.

Pamela Tshwete



MESSAGE FROM THE DIRECTOR-GENERAL OF THE DWS

Water is essential for all forms of life and crucial for human development. In South Africa, our Constitution and water legislation entitles everyone to sufficient, safe water for personal and domestic uses.

Integrated water resource management (IWRM) coordinates the development and management of water, land and related resources. It seeks to maximise social and economic welfare in an equitable manner, to sustain ecosystems and to bring together the technical, ecological, social and political spheres.

For IWRM to be truly successful in South Africa, we need to involve both men and women in the management of water. We need to tap into the knowledge, experience and common sense that women possess regarding the use and management of water resources. There is a tendency to overemphasise women's reproductive roles in relation to water resource management – i.e. those tasks that span providing, managing and safeguarding water for use by the family. But women have pressing needs too for water to engage in economic production, including agriculture and microenterprise.

The world is fast realising that women playing influential roles at all levels over the long term could also hasten the achievement of sustainability in the management of scarce water resources. Led by the Department of Water and Sanitation, women's voices ring strongly in the chambers of policy- and decision-making in South Africa. In addition, we are making real progress in ensuring that local water and sanitation committees are representative of all water users in the catchment or sub-catchment.

This taps into the fact that South Africa has a proud tradition of powerful women. Women were integrally involved in our struggle for liberation from command structures to ordinary foot soldiers, and many sacrificed their health and their lives for freedom. The following pages are testimony to the fact that even ordinary women have done extraordinary things in South Africa.

Margaret-Ann Diedricks



MESSAGE OF SUPPORT FROM THE CEO OF THE WATER RESEARCH COMMISSION

There is a woman at the beginning of all things. So said French poet, Alphonse de Lamartine.

This certainly rings true for South Africa's women in water. Many of them have risen above circumstance to lead the way in a new era. They have helped rid the sector of its unequal past and paved the way for the future through new policies and legislation.

Today South Africa is at the forefront in advocating for the inclusivity of women and women's needs and interests. Government has passed legislation to formalise its commitments toward achieving gender equality in South Africa, thereby creating a public space where women's voices have a platform. Drawing on these national objectives the water sector has prioritised gender mainstreaming, and this sector has seen a significant number of women enter and take up senior leadership positions.

No longer is the typical picture of women in water that of women travelling far distances to fetch water in buckets. While this scene unfortunately still persists in isolated pockets in South Africa there is also another, more dominant picture emerging. A picture of strong women taking the lead in their communities, women who use their knowledge, skills and capacity in different fields to ensure that water management in South Africa contributes to a better life for all.

Women in the water sector have held, and continue to hold, the highest offices, including those of Minister of Water and Sanitation, Deputy Minister, senior advisors, and numerous other high-profile and decision-making positions. The sector has been successful in achieving gender parity in many of its institutions, and the success achieved by the Department of Water and Sanitation in this regard is exemplary.

It is to honour the contribution of such women of calibre that the WRC, with the Department of Water and Sanitation presents this publication on Women in Water. The women profiled in this publication are but a small reflection of the many women throughout the country who are making waves in the water sector, and are changing the lives of all South Africans for the better. It is hoped that the tales of these women's journeys will serve as an inspiration to future female leaders in water.

Dhesigen Naidoo

The image features a woman in the foreground, wearing a patterned headscarf and a dark jacket, holding a long-handled water filter. The background is a blurred outdoor setting. The top of the image is decorated with a colorful, abstract geometric pattern consisting of various shapes like triangles, circles, and zig-zags in shades of orange, red, green, and blue. The entire image has a blue tint.

CHAPTER 1

Leading change in the water sector

“Woman must not accept; she must challenge. She must not be awed by that which has been built up around her; she must reverence that woman in her which struggles for expression.”

Margaret Sanger (US social activist)





DEBORAH MOCHOTLHI

Deborah was born and raised in Mafikeng. Her father was a mine worker for De Beers and her mother was a domestic helper. She is the eldest of eight children. Her parents instilled in her the value of hard work in order to achieve career success from an early age.

Her father's occupation became a blessing in a sense because De Beers offered Deborah a bursary that enabled her to complete matric. Although she attained the necessary grade to qualify for university entry, financial circumstances forced her to seek work after completing her schooling.

She landed a job as a clerk with the Ministry of Public Works where she worked for two years. During this time she applied for as many scholarship opportunities as she could and she was eventually rewarded with a bursary by the Department of Health. She became the first African woman to study public health (later renamed environmental health). She eventually qualified with a Masters in Environmental Science.

Deborah views her qualifications as one of the primary drivers for success in her life. These qualifications were attained through resilience, focus and determination even in environments that were often difficult to succeed in. Her hard work has paid off as she is today the Deputy Director-General: Planning and Information at the Department of Water and Sanitation.

"Women need support structures, such as flexible working hours that can enable them to meet the requirements of their careers."

Her work experience has been helpful to teach her how to pay attention to detail and to emphasise quality in her work. This makes her strive for perfection in anything she does, which is not always easy, given her heavy workload. To ensure that she meets all her responsibilities, she often works beyond the required hours. This allows her to pay attention to detail and to perfect her work.

Deborah does not limit her support to women. She supports both women and men who need her support but she is conscious that women have special needs. She believes that the requirements for career success cannot be diluted to make it easy for women to succeed because that would result in poor performance.





(Photo credit: Felix Reinders)

“Women’s roles should be elevated from that of just collecting of water and the use of water for domestic use and in the family plot but to that of active participation and progressing to decision making on community level.”



Mary Jean (right) represents the Department of Agriculture, Forestry and Fisheries at several forums.

MARY JEAN GABRIEL

Mary Jean Gabriel grew up in Thohoyandou, Venda, and holds a BSc (Hons) from the University of Venda.

While studying she was inspired by her supervisors Profs Ian Gaigher and Ben van der Walt who were both ichthyologists. “My main field of study was aquatic ecosystems and looking at aquatic invertebrates as indicators of water quality. When I started working it was natural that my line of work would gravitate to that relating to water resources management,” she says.

Between 1998 and 2003 she worked in the then Department of Water Affairs and Forestry in the Institute of Water Quality Studies (today Resource Quality Studies or RQS). She was part of the team who worked on the Reserve and used biomonitoring techniques to determine the quality of water. During this time she was part of a team who developed two guides for the identification of aquatic invertebrates, namely the *Aquatic Invertebrates of South African Rivers Field Guide* and *Illustrations*, which is still being used today. She also authored and co-authored various papers.

From there she moved to the Gauteng Department of Agriculture, Conservation, Environment and Land. Her responsibility included implementing the Expanded Public Works Programmes, and community-based natural resources management (NRM) projects. The Matshepo Khumbane Awards (which seeks to award members of the community in Gauteng who developed or used best NRM practises in various projects in the province) was developed during her tenure in the department.

In 2007 she moved to her current position as Director: Water Use and Irrigation Development in the Department of Agriculture, Forestry and Fisheries (DAFF). “We develop policies, guidelines and similar documents on irrigation initiatives. We also support research with the Water Research Commission (WRC) relating to the use of water by agriculture, explains Mary Jean.”

Her department also supports the Provincial Departments of Agriculture in their irrigation initiatives by assisting with the development of documents for sourcing of funds, providing technical assistance and so forth.

Mary Jean has co-written the Irrigation Strategy for South Africa and compiled the inputs from the Provincial Departments of Agriculture to develop the business plan on the revitalisation of irrigation schemes. She also represents DAFF in various forums, including the South African Regional Irrigation Association, South African National Committee on Irrigation and Drainage and International Commission on Irrigation and Drainage.

Despite all these career highlights, Mary Jean considers her biggest achievement earning the trust and respect of the experts and specialists within the irrigation field – a sector she did not initially come from.

She considers Mma Tshepo Khumbane (featured elsewhere in this publication) as her greatest inspiration. "She has shown that with hard work and innovation one can feed oneself and one's family."

"Through her method of mind mobilisation, women in the rural can be trained and motivated to feed the community by growing crops and vegetables," adds Mary Jean.

Mary Jean has strong opinions about the role of women in the water sector. "Longstanding cultural expectations of gender roles and responsibilities directly influence many of the processes related to water resources management – activities related to livelihoods are allocated on the basis of the gender of the community member. Women's roles should be elevated from that of just collecting of water and the use of water for domestic use and in the family plot but to that of active participation and progressing to decision making on community level."

Mary Jean ends with sound advice for other women contemplating a career in the water sector. "Surround yourself with good, strong ethical people who value the earth, its diverse people; respect the contributions that each has to offer and use the lessons they teach to develop your potential."



"As women we need to respect water as the gift of life. Our basic role is to educate our children and community to conserve water. We must regard ourselves as fortunate that we drink our water directly from the tap in South Africa."

MPHARU HLOYI

Mpharu Hloyi is the first African woman to head the City of Cape Town's Scientific Services department.

Born in Tladi Township, Soweto, Mpharu is married and has two daughters and a son. She matriculated from Sekitla High School and holds an MSc degree from the University of the Western Cape.

According to Mpharu, she was mentored by her post-graduate supervisor, Prof Andrew Couch, to follow her current career path. "He built up my confidence to publish scientific papers presented in conferences, such as the South African Chemical Institute and the Water Institute of Southern Africa, among others. When I started working, my passion for scientific publications continued and I was involved in various water-related research projects."

Mpharu adds that her research background was the foundation, which assisted her to learn fast in the water and environment sector. "The interpretation of legislative requirements and aligning it to my scientific background gave me the fulfilment for my career development path."

Mpharu started her career at the City of Cape Town in 1998 as a scientific officer in the Trade Waste Section, focusing on industrial effluent and solid waste monitoring. Here her work included visiting industries in and around Cape Town and ensuring that they complied with the metro's bylaws. Included in her duties was managing the laboratory staff and developing laboratory work flows and processes.

In 2004, Mpharu spent a short while at Amatola Water in East London, working as Manager: Scientific Services. Here she was accountable for water quality management of drinking water and wastewater. In 2005, she was invited back by the City of Cape Town in her current position as Manager: Scientific Services.

In her current position, Mpharu is accountable for laboratory services for all the directorates of the City, including Water and Sanitation, City Parks, Health Department, Solid Waste and external clients. "We give analytical, advisory and monitoring services across the whole water value chain, as well as undertake air quality monitoring and environmental management," explains Mpharu.

She has had many mentors in her life, but singles out Sipho Mosai, who was willing to employ her at the City of Cape Town despite the fact that she was eight months pregnant at the time. "The fact that I was pregnant and he still appointed me makes me to respect him even more for believing in the skills I possess. I knew that there was no such thing as a free lunch. He taught me to make decisions – whether right or wrong – and to learn from my mistakes."

In 2006, she was honoured with a Women in Water Award in the 'Management and Policy' category.

However, Mpharu considers her greatest achievement to date the fact that she managed to build a competent work force in the water and environmental sectors, looking at the future demands of scarce skills, which is currently a national challenge. "Before my leadership, Scientific Services had a culture of appointing microbiologists and chemists only. My vision was to shift that culture and embrace all emerging water and environmental science fields that support our functions."

As a result of this vision, the City of Cape Town has been able to attract staff possessing Degrees in freshwater ecology, aquatic biology, hydrobiology, biodiversity and conservation, water utilisation, atmospheric science, statistical science, material science, applied mathematics and computer science through the external bursary programme.

"We have extensive and diverse collaborations with the WRC and academic institutions on research and development in the water and environmental sector," adds Mpharu. "We have been able to attract highly qualified PhD graduate managers leading the wastewater and research and development components. My vision is to continue to build a centre of excellence in the City and the country in the field of water and sanitation as well as climate change through our various laboratories."

Mpharu's greatest challenge to date has been to find measurable standards of laboratory turnaround times. Maintaining high levels

of service to the City's customers is another challenge. "We were forced to undertake business re-engineering with the involvement of staff. Through initiatives such as a three-year job rotation plan that allows for multiskilling, we have moved from a silo mentality to an integrated approach based on where the resource need arises."

Women have a very important role to play in the water and sanitation sector, says Mpharu. "Firstly, as women we need to respect water as the gift of life. Our basic role is to educate our children and community to conserve water. We must regard ourselves as fortunate that we drink our water directly from the tap in South Africa."

South Africa's Constitution makes provision that everyone in the country has the right to safe drinking water. "To give effect to this right, our communities can check at any given time their water quality status through the My Water page of the Department of Water and Sanitation website. At the same time, we cannot afford to contaminate water in such a way that we are unable to reuse it for other purposes, such as agriculture, which contributes to our economy."

Mpharu's advice to young female scientists is not to be scared of uncomfortable research findings. "You need to be able to report your results, such as 'There is cholera in the water'," she notes. "You need to have passion and respect the gift of nature, respect the ecosystem. You need to have an analytical mind and the cognitive ability to be able to find real solutions to everyday problems through research and development. Lastly, you need to be able to balance ethical and social issues in a professional manner."



Despite her senior position at the City of Cape Town, Mpharu still feels most comfortable in the laboratory.



EIMAN KARAR

Eiman Karar has more than 20 years' experience in natural resources management. She grew up in Sudan as the youngest in a family of two boys and two girls. In her family education was compulsory for both boys and girls and this enabled her to obtain an education in a country where education for girls in the rural areas was not common.

She attended an all-girl Christian Catholic secondary school, and an English senior school. The norm was that girls got married before they even finished their university degrees. Her father, however, played a major role in protecting her from this and giving her the space to pursue those things that were important to her. She graduated with a Masters from the University of Khartoum and went on to further her studies in the United Kingdom for a PhD with two years' secured funding at the University of East Anglia.

After her second year, she had to discontinue her studies in the absence of further funding and moved to South Africa. When she came to South Africa in 1995 she registered at the University of Natal for the same PhD whilst earning some money from working with Honours students in the School of Environmental Sciences.

She moved to Umgeni Water to work as a soil erosion expert to address the high siltation rate in Hazelmere Dam, KwaZulu-Natal. There she set up the first Catchment Management Forum in KwaZulu-Natal at Mdloti, which is the river in which Hazelmere Dam is located. This became a joint effort with the Department of Water and Sanitation (DWS) as it is now known.

This was at the time when the National Water Act (1998) was established, and in light of the Act and the formation of catchment areas, Umgeni Water decided to enhance their catchment activities and appointed Eiman as a Catchment Management Coordinator. She worked there for six years from 1996 to 2001 after which she was appointed as the Director of Catchment Management at the DWS. From the department she joined the WRC in 2005 as a Research Manager and in 2006 became the Executive Manager: Water Resource Management.

Eiman feels that she is in a place at the WRC where she thrives and enjoys what she does. She feels that the WRC offers her an environment that has allowed her to develop, and it is an honest culture whereby people are given positive reinforcement when they do well and helpful guidance in areas where they can improve. There is a general willingness to learn and to adopt a shared vision in an enabling culture where the goal is to achieve the highest potential in deliverables.

"Women bring to the table issues that are not easily noted by men. Further, they become role models for younger women."



Eiman Karar was privileged to meet former Chairperson of the Palestine Liberation Organisation, Yasser Arafat.

She believes that women in senior management are transformative in a positive way. They bring about diversity of views and broaden the policies and see things differently from the men. "Women bring to the table issues that are not easily noted by men. Further, they become role models for younger women."



ELAINE SALO

Prof Elaine Salo has come a long way from Kimberley, in the Northern Cape, where she grew up. Elaine was educated at William Pescod Senior Secondary School, in Kimberley, and went to study at the University of Cape Town where she completed her BA Honours Degree. She then received a Fulbright Scholarship to the US, where she completed her Masters Degree in International Development.

She is both a Mac Arthur Fellow and a Rockefeller fellow, and completed her PhD at Emory University in 2004. She lists a host of mentors who inspired her to follow her current career path. "The most important mentors in my life have been my parents, the Judy Scott librarian in Kimberley, Marie Musson, as well as political activists and lecturers whom I revered as role models in the 1980s – my landlady in Athlone, Johanna Johnstone, education activist, Elizabeth Van Der Heyden, scholar activists, Dr Neville Alexander, Ginny Volbrecht, Fatima Meer, and my undergraduate friends, Dr Desiree Lewis and attorney, Zorina Bavasah. They all emphasised the power of education for women's empowerment."

While Elaine has a PhD in Social Anthropology her passion is really about how states formulate policies on the African continent and whether these address the gendered interests of African women.

"I have learned to push at doors that appear tightly shut to women like me, and to step across boundaries with courage."

Despite her impressive resume it was initially not easy to find employment. "I returned to South Africa in 1986, after completing a Masters at Clark University in the USA, as a Fulbright scholar. I recall traveling to various places, such as Grahamstown, and Cape Town by train, and knocking on doors of social science departments, looking for an entry level research position. Prof Frances Wilson, who was Director of the Southern African Labour Development Research Unit (SALDRU) at the University of Cape Town (UCT) offered me a position, along with a small cohort of diverse researchers, to do supportive research for various anti-apartheid organisations, as well as the Second Carnegie Inquiry into Poverty."

SALDRU was a particularly invaluable space in the 1980s and 1990s – a nursery of sorts, nurtured by a wonderful human being, Dudley Horner. The place launched many careers in various aspects of South African public life. After two years at SALDRU, Elaine began her academic career as a junior lecturer in the Department of Sociology and Anthropology at the University of the Western Cape. There she remained there for 12 years, before returning to the US to do her doctoral studies. Thereafter Elaine was employed at the African Gender Institute (UCT) as a senior lecturer; as the Director of the Institute for Women's and Gender Studies (IWGS) and Associate Professor in Anthropology at the University of Pretoria (UP).

"During my tenure at UP I began to work with colleagues at the WRC (Eiman Karar, Barbara Schreiner, Barbara Van Koppen, Barbara Tapela, Inga Jacobs-Mata and others) who were interested in water policies and gendered access to safe water and sanitation," notes Elaine. "I developed a passion for women's access to safe, secure water and sanitation through these collaborations."

The IWGS and the WRC hosted two successful research seminars on water and gender in 2012 and 2013 to focus on the gains and challenges in African water policies and gender. These seminars as well as the discussions at the WRC culminated in the African Water Policies and Gender study, a groundbreaking continental research project that was funded by the Global Water Partnerships. The findings were presented at the International Water, Gender and Development Conference held in East London in 2014, attended by a number of African water ministers as well as the African Ministers Council on Water.

In 2014, Elaine joined the University of Delaware, in the US, as Associate Professor in Political Science and Women's Studies. In her current position she works on the publication of the African Water Policies and Gender Studies (to be published by the WRC).

"I teach the gendered politics of water in the Global South (comparing water access in countries such as India, Brazil, Kenya, South Africa, and China) to graduates, most of whom are international students from the global South as well other Gender and Politics courses," Elaine adds.

"During the US summer (July to August) I am the Academic Director for the African Young Women's Leadership programme. This program recruits 25 young African women leaders for training in civic leadership, gender and policy and is the highlight of my professional position at the University of Delaware. This summer we hosted young women from South Sudan, Sudan, Mali, Cote D'Ivoire and Zambia. Needless to say, women's leadership and access to safe water and sanitation in Africa are a major part of my focus in this programme!"

Ensuring that women occupy their rightful place as informed policymakers and researchers in the African public sector has been Elaine's greatest achievement. This has meant mentoring successive generations of African women researchers; working with feminist collectives to establish two African feminist journals; publishing research and writing; working with policymakers to address the gaps between well intentioned policy and poor implementation; as well as being a mentor to and being inspired by young African women in the academy and in governance.

During her journey she has had to endure not only the typical gender stereotyping, but also – in the early days – apartheid. "My journey as a researcher and a professional academic began during the apartheid heyday. I learned early on, during my everyday experiences as a black woman undergraduate at UCT, that my ambitions, voice and legitimate desire to become a bona fide researcher would not be heard there."

Elaine was reading Fatima Meer, and other black women's writings at that point – and their writings opened up other worlds for her. "I began to look elsewhere for international study opportunities. Serendipitously I saw the small Fulbright advertisement in a newspaper in 1984 and applied for the scholarship. As a Fulbright alumnus I have learned to push at doors that appear tightly shut to women like me, and to step across boundaries with courage.

International research experience and study have enabled me to build a global network of supportive researchers, scholars and civic activists in my field. I am deeply grateful for these networks."

The other challenge has been to build a sustainable research organisation, raise research funding and mentor young women researchers and maintain a respectable publications record. "During my last position in South Africa, these multiple responsibilities proved to be challenging and I could not have achieved some success without working collaboratively with a supportive organisation such as the WRC or the gender scholars and activist networks outside the university," says Elaine.

"In two instances I have had to face professional workplace bullying from a white woman manager who felt threatened by me, and encountered the threat of professional sanction from a senior male colleague who considered me too forthright. Thankfully these experiences have been rare – and they helped me decide to move onto employment elsewhere."

These experiences have also attuned her to the webs of power within organisations and to learn how to operate diplomatically within them. However, she has elected to leave jobs when she has experienced these webs of gendered and racial power as too constraining.

"I have ensured that I build a wide, supportive professional network of supportive women wherever I go, and I rely upon that network for mutual support and inspiration. I have also learned to provide supportive criticism to junior women researchers in a manner that is supportive, and to affirm their work. I do, however, sorely miss my everyday engagements with my dear colleagues in the gender and water sector at the WRC!"

Elaine notes that the African continent is replete with excellent constitutions and water policies that enshrine equal gendered access to natural resources. In addition, women are well represented at the highest levels of executive decision making in water governance. The primary challenge, according to Elaine, lies in the effective and substantive commitment of resources and in monitoring and evaluation to ensure gender sensitive policy implementation in the water sector. "This is especially so at the level of provincial and local government. In many cases countries are dependent upon international donors to assist in policy implementation – so that the state often implements water policy unevenly and is constrained by lack of resources and capacity. Increasingly we are

seeing conflicting demands being made on water resources for big infrastructural projects such as the Renaissance Dam in Ethiopia and the Lesotho Highlands Water Project, on the one hand, and the claims of ordinary women and other vulnerable populations on unfettered access to safe water sources.”

Many African countries, such as Gabon, Ethiopia and Angola are experiencing high economic growth rates. The contesting claims upon water for economic growth on the one hand and women’s gendered access to water for health, sanitation will become an increasing challenge. Civil society leadership will play a vital role in holding states accountable to ensure women’s gendered rights to water; while supporting policymakers in enabling policies.

African women have always played a primary role in ensuring food and water security in households across the continent, notes Elaine. “Our economic roles are pivotal to the health and well-being of the continent’s population. African women’s access to safe water and sanitation is vital for the continent’s prosperity.”



CONNIE SEPTEMBER

Cornelia ‘Connie’ September was born in 1959 in the Cape Town suburb of Grassy Park. She grew up in Lotus, and matriculated from Grassy Park High School in 1977 and was an active member of the anti-apartheid youth movement which took place in the Cape during the 1970s and 1980s.

Life presented Connie with a host of challenging circumstances. She grew up in a poor family and was raised in a neighbourhood which was socially and economically disadvantaged. She managed to rise above these challenges through her determination to see change. She yearned for an education and invested a significant amount of time and energy into pursuing it. This was not easy to achieve given the political and social climate of the time.

Her contribution to the liberation movement was also pivotal as it provided her with a channel to influence events and to overcome the challenges which she and many other individuals and communities faced.

While at COSATU she completed her teaching diploma and relished the opportunity to empower others through teaching. She actively engaged in trade-union negotiation processes and quickly worked her way up the hierarchy of COSATU. In 1993 she was appointed Second Deputy President of the Union, the first female to occupy this post, and in 1999 she was elected to the position of First Deputy President. In that same year she became a Member of Parliament, representing the ANC in the National Assembly.

She has served as special adviser to the Minister of Water and Environmental Affairs. She has also served as the Chairperson of several portfolio committees in Parliament, most notably the Portfolio Committee on Water Affairs and Forestry. In 2013, Connie was appointed the Minister of Human Settlements. At the time of writing she served as Chairperson of the Joint Standing Committee on Intelligence.

Her advice to women entering the sector is not to allow the gender issues of other people to adversely affect their own progress. “It is important not to subscribe to the culture of women having to convince their seniors of their ability and worth. Women should not have to compromise themselves. These issues should not distract women in the sector and they need to focus on their role and contribution in the development of the sector, not only in terms of delivery but also in terms of the development of people in the sector.”



MARINA KRÜGER

Midvaal Water Director: Operations, Marina Krüger, is a dedicated team player with a sense of purpose.

Growing up on a farm between Zeerust and Mafikeng in the North West allowed Marina to be close to nature. She became aware of the important role of water through her parents, who kept extended data on rainfall on their farm for the authorities. "I use to sit with my mother and father keeping strict record of the number of millimetres of rain that fell on a particular day, comparing it to previous years," she recalls.

Still, water was not in the back of her mind when she chose to study botany and zoology at the University of Potchefstroom (now North-West University). After a stint of teaching science she yearned for the inside of a laboratory. She ended up working for a water treatment chemicals supplier. This marked her official entrance into the water sector.

She did work for various industry and mining houses on, for example, the development of polymers for water treatment. Later she moved to NWU to research the use of different grass cultivars for the rehabilitation of mine dumps. "This was real donkey work," she laughs, "staring at a bunch of seeds and literally watching them grow."

Later she was employed by Midvaal Water Company, which renders operation, maintenance and consultancy services for water treatment plants and sewerage works in addition to bulk water supply to the municipality and mining and industrial users in the Klerksdorp area. Here she was first appointed as a lab technician with the aim of setting up the firm's laboratory services.

Through the years Marina has participated in identifying and solving many of the challenges faced by the water supply company, growing and extended the laboratory along the way. The poor quality of the raw water drawn from the Middle Vaal remains a persistent problem, resulting in Midvaal Water having to closely monitor its source water while continuously evaluating and adapting its water treatment process. The water that enters the Middle Vaal River contains a large proportion of urban and industrial return flows, with the water having been through more than one cycle of use. Consequently, salinity levels can be extremely high. High nutrient levels also occur as a result of the large domestic component of return flows which, together with the low turbidity of the return flows, stimulates excessive algal growth. Marina and her team have also dealt with another problem. When water users started complaining about the brown colour of their drinking water in the mid-1980s, investigations found high levels of manganese due to groundwater pollution from gold mining activities. This groundwater found its way into the Middle Vaal, Midvaal's main source of raw water.

Again the laboratory's services were extended to include metal analysis. Pilot work was undertaken to remove the manganese from the drinking water. This resulted in Midvaal Water becoming one of the first drinking water suppliers in the country to implement ozone in its treatment process. "I have become a real advocate for ozone technology," says Marina. "On further inspection we found the application of ozone had other benefits, for example, colour removal, and it continues to play a significant role in maintaining the high standard of our drinking water."

Today, Midvaal Water operates an accredited and well-equipped laboratory. Midvaal Scientific Services provides both analytical and consulting services to customers and clients on all aspects of water purification, underground water and effluents. The laboratory is

increasingly contributing to the company's bottom line by attracting outside income, important when one considers that water sales are dropping due to the decline of the local mining industry.

Marina is quick to point out that none of the company's success is due to her efforts alone. "Here we always operate as a team. Nothing is reached through one's own steam." She is driven by her continuous search for knowledge. "Just when you think you understand all there is to know about water, it has a way of throwing you a curve ball," she says. "There is always more to investigate, more challenges to overcome."



"While government needs to support women, there can be no substitute for hard work in attaining success."

THANDEKA MBASSA-SIGABI

Thandeka Rosemary Mbassa-Sigabi grew up in the rural areas of the Eastern Cape. She describes her childhood home as an area characterised by poor service delivery that compromised the quality of life of people who lived in it. This experience had an impact on her and influenced her desire for change. She understood that education was essential to achieve this and she worked hard at school.

She had strong role-models in the form of her mother and grandmother. "My mother was a hard-working woman who was determined to see her children through school. This built a strong sense of responsibility in me, and I felt inspired to succeed if only to meet the wishes and hopes of my mother." Her grandmother's sense of values also inspired her. "While she was not a career woman, she imbued me with a sense of values and principles."

Not knowing that she would one day become a manager in the public sector, Thandeka began her training in the field of natural sciences, but soon became interested in development issues. She completed her studies with a qualification in regional and town planning, noting that it was the political atmosphere in South Africa during the time of her schooling that influenced this interest. Having been too young to participate in the anti-apartheid struggle, she later viewed a career in the public sector as an opportunity to contribute to the country.

She began her career in a municipality in East London and then moved to the Eastern Cape Department of Land Affairs. Her first appointment in the former Department of Water Affairs and Forestry was in the Eastern Cape as the provincial director of implementation. From here she advanced to become the DDG: Regions in the department's head office in Pretoria. Today, Thandeka is head of the Gauteng Department of Agriculture and Rural Development. The main objective of this department is to unlock the full potential of environment, agriculture and rural development to enhance the economic, ecological and social wealth of all the people of Gauteng.

Thandeka believes that managers do not necessarily need to have technical skills, such as engineering, but they should be willing to learn from their colleagues to ensure that the desired outcomes from initiatives are achieved. Continued learning is important to Thandeka; she believes that managers should be pro-active and willing to adopt novel ways of doing things. She feels that the way in which this can be achieved is through knowledge sharing within the organisation.

"Success is hard work," says Thandeka. "While government needs to support women, there can be no substitute for hard work in attaining success." She further maintains that productivity should be emphasised as a prerequisite for career advancement. She also feels that there is a need for a mechanism which ensures that productive women are promoted without being stereotyped.



NTOMBIZANELE BILA-MUPARIWA

Former Department of Water and Sanitation (DWS) Director: Water Services Regulation, Ntombizanele Mary Bila-Mupariwa, works in a challenging environment in which service delivery and client service are paramount objectives.

She holds a National Diploma in Water Care from Tshwane University of Technology, as well as a B-Tech Degree in Environmental Management from the Cape University of Technology and a post-graduate diploma in integrated water resources management from the University of the Western Cape. She is a member of the Water Institute of Southern Africa and is a certified scientist with the South African National Council for Natural Scientific Professionals.

Her position at the department was where her significant experience in water quality, wastewater treatment processes, her understanding of local government and environmental management allowed her to provide decisive and confident leadership skills and build teams that continuously add value and exceed communities' expectations.

Zanele started her career as a laboratory technician. This has been followed by a strong career history in the DWS. In 1996, she joined what is now RQS as a learner laboratory technician. In 2008, she joined the DWS in Limpopo working as a learner technician, while conducting my in-service training.

When her husband secured a job in Cape Town she joined South African Breweries as a quality control technician on a temporary basis. In 2001, she volunteered at the City of Cape Town to work on one of the largest wastewater treatment works in order to gain more experience, and later joined the city's scientific services department as a laboratory technician.

A year later she went to work for DWS in the Western Cape Regional Office. When her family moved to Gauteng a few years later, she requested a transfer to the national office under the Directorate: Water Services Regulation.

Zanele then managed the Directorate: Water Services Regulation. Among others, she regulated water services authorities, water boards and private institutions on water services provisioning; provides technical regulation advice to international and external stakeholders; and moderates the Blue and Green Drop certification, among others.

She has since joined Siyasiza Water Consulting as a Director: Operations and Technical. Zanele discusses her experience as a woman working in the water sector: "It has not been an easy journey for me, but rather an interesting one, especially with regard to the treatment works. This is due to the fact that this area has traditionally been dominated by men as process controllers. It has been exciting to be one of the women who are breaking into this field."

Every day brings with it new challenges. "I am passionate about my work. I know that I am contributing to making difference in my country by ensuring that the public receives good quality drinking water, and making sure that our scarce resources are protected."



"If you don't put anything in, you won't get anything out. If something is worth doing, it is worth doing well."

JO BURGESS

Dr Jo Burgess is not only one of only a handful of women to become President of one of South Africa's leading water sector institutions – the Water Institute of Southern Africa (WISA), she is also considered a knowledge leader in the field of mine-water.

Jo was born and raised in England, and completed her studies there. She has a PhD in Environmental Biotechnology, and a Masters of Research in Innovating Manufacturing, specialising in Water Pollution Control Technology – both from Cranfield University.

She explains her entry into the water sector: "I love clean water and the creatures that live in it. I came into water research from an environmental protection background, first looking at pollution control and then getting into industrial wastewater treatment for my PhD. I was hooked on water research from that point on... I worked on a new process for a wastewater treatment plant that was releasing untreated antibiotics into a river.

"In 1993, the river was dead, just dead; killed from the very bottom of the foodchain upwards. The possible options were tested in the laboratory, then the most promising two options went to pilot trials, which I ran at Yorkshire Water's sewage treatment works. One of those pilot plants worked, and the new method was implemented in the new treatment plant. By 1999, the river was alive: there were plants, and fish and birds. It was amazing!"

Jo's first post in South Africa was as a senior postdoctoral research officer in the Department of Biochemistry, Microbiology and Biotechnology at Rhodes University, in Grahamstown. In 2004, she became Head of Biotechnology within the department, where she stayed until 2008. Later that year she joined the WRC, where she is a Research Manager, focusing on managing research in mine-water management and treatment technology.

WRC Research Managers are scientist and/or engineers in their own areas of work who fund and facilitate projects that are carried out by researchers at universities, water boards, backyard inventors and private companies. Most WRC research managers handle about 30 projects at a time.

"In addition, we offer policy and other advice to the relevant government departments," explains Jo. "We also serve the research community and water sector, for example, by holding posts as adjunct research staff at universities (Jo is a Senior Research Associate at Rhodes University), by serving on the Boards of water companies, and by acting as external examiners for courses and theses at academic institutions."

In 2014, Jo was elected President of WISA. She also serves as Chairperson of the WISA Board. In addition, she was one of the founding members and the first President of the Young Water Professionals network. She believes that women and men deserve equal places at the table for discussion and decision making, and equal opportunities for personal contribution to growth.

Jo considers herself lucky to have had a succession of fairy godmothers/godfathers guiding her along her career path. "If I had to choose my three most inspirational mentors, they would be Tom Stephenson, Chris Buckley and Heidi Snyman. They're of different nationalities and genders, but the main thing they have in common is an enormous generosity of spirit – they are willing to give it their time, knowledge, support, information, contacts and energy without hesitation. They have each risen to the top of their respective organisations, and/or fields of expertise with integrity, and I admire and aspire to that."

According to Jo, people are the greatest challenge in her day-to-day job. “Probably the trickiest thing is to get rival companies to collaborate. For example, I ran a project to investigate and decide the best methods of mining coal in the Waterberg region to avoid creating mining-impacted water, and one to work out the best way of handling mining waste for the same purpose. That involved getting 17 mining companies to talk to each other and to the regulator and share their data with each other. For those projects the science was easy, but the human aspects were hard.”

The most important lesson that she has learnt during her career is that the satisfaction you derive from something – a job, a project – is directly proportional to the size of the investment you made towards it in terms of time and effort. “If you don’t put anything in, you won’t get anything out. If something is worth doing, it is worth doing well.”



“The biggest task of women in the water sector is to capacitate and empower other women who are not as fortunate.”

JENNIFER MOLWANTWA

Dr Jennifer Molwantwa was born and bred in Kagiso Township, in the west of Johannesburg.

It was her home environment that prompted her career in the water sector. “There are mine dumps around Kagiso, and the water quality was always said to be bad in the area, while in the rural areas we could swim in the streams when visiting my grandmothers. The two did not add up,” explains Jennifer.

She received her tertiary education in the Eastern Cape where she obtained a PhD degree in Biotechnology, majoring in mine-water treatment. She got into a discussion with her supervisor, Prof Peter Rose, about sulphate reducing bacteria and water treatment. This got her hooked on the subject. “While my current work is not focused on mine-water treatment per se, the quality of water resources is an important aspect and one that I am passionate about.”

Jennifer is a registered professional natural scientist with the South African National Council for Scientific Professions. She has been an active member of WISA since 2004. She is the recipient of the WISA Mine Water Division Best Paper Presented by a Student (2004) and Excellence in Research Award for a young scientist from in 2006. Jennifer was also instrumental in the establishment of the WISA YWP network in 2006.

She got her big break in the water sector when, in 2002, after completing her MSc Degree, she joined consulting firm, Pulles Howard DeLange as a research assistant in mine-water treatment for two years after which she pursued a PhD dealing with one of the projects. “In July 2006 when the company merged with Golder and Associates, I started as a water resource manager, where I remained until 2008,” she explains. She then joined Digby Wells and Associates.

Today, she is a Research Manager at the WRC. Here she is responsible for the portfolio of Water Resource Quality. She is trusted with funding institutions and small, medium and micro enterprises to undertake research on the subject that can be either in the area of monitoring, modelling or even looking at the impact of water.

“I am passionate about the fact that capacity building is one of the key pillars at the WRC,” notes Jennifer. “This is ensured by including especially previously disadvantaged individuals on our projects as post-graduate students and by expanding the Commission’s footprint to the length and breadth of South Africa, in particular to historically disadvantaged institutions.”

The greatest challenge in any job is to manage relationships with others. "I am the type of woman who wants to empower and capacitate fellow women, but some are not readily open for such blatant and forceful efforts," she says. "I worry that I have not managed to get to all historically disadvantaged institutions and the number of South African students [on WRC projects] is not what it could be."

One of her biggest career highlights happened in 2010 when she was selected as one of the 26 commissioners to serve on the National Planning Commission headed by former Minister Trevor Manuel in the Office of the Presidency. This part-time position entailed planning for the future of South Africa for the next 15 to 20 years, where a vision for the country and a plan of how to get there was developed.

The resultant National Development Plan looks at key issues such as food security, water security, energy choices, economic development, poverty and inequality, structure of the economy, human resources development, social cohesion, defence capabilities and scientific progress.

Since then she has also been appointed to serve on the Council of the University of KwaZulu-Natal where Jennifer also represented Council on Senate. A third appointment has been to the Governing Board of the Inkomati-Usuthu Catchment Management Agency.

Jennifer does not mince her words when it comes to her thoughts on the role women can play in the water sector. "Mothers nurture their families and therefore have a role to play in ensuring that



It was the mine dumps around her home that prompted Jennifer to pursue a career in water quality.

children have good quality water. If there are issues they need to be proactive and report these. They also need to stand up and be active citizens in water-related forums."

The road is open for women to participate at all levels in the water sector, from being engineers, scientists, consultants, municipal managers, mayors, directors, and even, of course, ministers. "The biggest task of women in the water sector is to capacitate and empower other women who are not as fortunate," adds Jennifer. "We have to have empathy to be able to at least fight for their cause along with them. An educated woman can educate the nation."





ROBYN STEIN

Robyn has untiringly contributed to the development of the legal framework for water management in South Africa.

Her commitment to the equitable allocation and beneficial use of water, especially for the poor, is noteworthy. Robyn was one of the first recipients of the Women in Water Award in 2002.

She obtained the degrees of BA (conferred in 1988) and LLB Cum Laude (conferred in 1990) at the University of the Witwatersrand (Wits). In 1992, she obtained an LLM Degree *with Distinction* at the London School of Economics and Political Science. She was admitted as an Attorney to the High Court of South Africa in 1993.

Robyn was a special advisor to the Minister of Water Affairs and Forestry in respect of the Water Law Review Process and played a key role in the drafting of the National Water Act of 1998, the Water Services Act of 1997 and the White Paper on a National Water Policy for South Africa.

In 1996, she was appointed as a member of the IUCN Commission on Environmental Law. In 1998, Robyn was appointed as a member of the International Nuclear Law Association and as Vice Chair of the Water Law Committee of the International Bar Association's Section on Energy and Natural Resources Law.

In March 1999, she was appointed as an Honorary Associate of the University of Dundee Centre for Energy, Petroleum, and Mineral Law & Policy in recognition of her work in the field of water law in South Africa. In this year she was also appointed to the National Water Advisory Council in South Africa.

She has served as Chair of the Advisory Committee on Dam Safety where she has challenged conventional notions on public safety in order to protect the interests of the vulnerable. She has also served on the Water Tribunal.

Robyn is now a corporate legal advisor and heads up the Environmental Law Division at the firm Edward Nathan where she is a director. Her practice is multidisciplinary and ranges from advising on environment, energy, mining and water law issues arising in due diligence, aspects of mergers and acquisitions, project finance, listings to legislative drafting, permitting processes and litigation. She was awarded Leading Environment Practitioner in South Africa by the Practical Law Company in 2005.

She has developed a course on water legislation for the Wits University and is now a professor of law.





ROWENA HAY

To find a woman qualified in Earth Sciences is rare. Finding one that manages her own Earth Sciences company is even rarer. Rowena Hay is the Managing Director (MD) of Umvoto Africa, which she founded in 1992.

Rowena grew up on a farm in the Eastern Cape on the northern foothills of the Katberg Mountains. She matriculated from Queenstown Girls High School, and later graduated with an MSc in Marine Geology (1984) from the University of Cape Town where she also completed her undergraduate (1978) and Honours (1981) degrees.

“Complete a comprehensive undergraduate science or engineering degree to the very best of your ability. Read widely. Know enough about related disciplines to be able to realise the worthwhile from the band wagon.”

Her first position in formal employ was as a site geologist on the Lesotho Highlands Water Scheme during the geotechnical drilling for the tunnel between Lesotho and Clarens. This followed part-time work as a student logging core for various geotechnical investigations on the dam sites around Cape Town and bridges being built along the N2 highway in the late 1970s and early 1980s.

She then worked as a computer programmer for Anglo American before moving to the Atomic Energy Corporation in the late 1980s. A period of secondment as a visiting scientist at NAGRA in Switzerland followed. “This enhanced my modelling experience in connection with the hydrogeological and practical challenges of the long-term storage of nuclear waste in various geological environments and concepts of risk management,” explains Rowena. “This work combined my interest in geology, computer applications, strategy and an instinct for risk!”

On her return to South Africa she chose to remain in this field and enjoyed using the approaches developed to quantify the risks of nuclear waste disposal (and numerical modelling of sedimentary environments to predict placer gold deposits) in groundwater exploration for urban and commercial agriculture use. Today she is a practising hydrogeological and disaster risk reduction consultant and the MD of her own company.

Rowena considers building a company with a reputation for technical excellence and innovation as one of her greatest achievements to date. Umvoto Africa consults in integrated water resource evaluation, development and management, contamination and remediation studies, education and training and process facilitation, plus geoinformatics. The company also undertakes ecological risk management studies that evaluate the human, environmental and business risks associated with natural disasters like earthquakes, floods and tsunamis.

“Being MD of a small knowledge firm means being involved in the financial, HR and technical aspects of the work. I have enjoyed working on water resources planning and practical groundwater augmentation projects, as well as working with the United Nations International Strategy for Disaster Reduction (UN/ISDR) in Geneva and Nairobi on a wide variety of issues related to disaster risk reduction.”

Life is not without its challenges. Rowena lists maintaining professional and personal integrity in the face of a difficult working climate as one of them. She quotes Shakespeare: “To thine own self be true and it must follow, as the night the day, thou canst not then be false to any man.” She adds: “Self-knowledge and getting out of my own way is an ongoing challenge.”

She considers Isa Thompson, Chief Engineer: National Water Resource Planning at the Department of Water and Sanitation as her greatest inspiration. “She is an excellent water resources engineer with practical experience in all aspects of water resource evaluation,

development and management. She combines an insistence on thoughtful and high technical standards, a meticulous yet common sense approach to managing project deliverables with a personal warmth and insight into people that realises the best for projects she is involved in. She has always been ahead of the curve in realising the merits of new ideas that are presented and adds value through insisting on rigorous standards of examination for them. And she has a great sense of humour."

Rowena ends off with some advice for young women entering this field of study: "Complete a comprehensive undergraduate science or engineering degree to the very best of your ability. Read widely. Know enough about related disciplines to be able to realise the worthwhile from the band wagon. Consider an MSc to be a minimum qualification, only doing a thesis in a subject that actually interests you."



"To succeed in this sector one must be willing to learn continuously and think creatively to come up with the solutions that will solve South Africa's water challenges."

NOMVULA MOFOKENG

As Unit Head: Water Services Regulation and Policy Development at the City of Johannesburg, Nomvula Mofokeng has an important job to ensure that South Africa's most crowded city's water services stays in tip-top shape.

She is a focused, business-orientated professional who sees her work as part of an ongoing assignment for transformative interventions. "Through a wealth of knowledge and transferable skills, I have continuously succeeded in the effective delivery of strategic leadership through the inception, development and management of programmes advancing organisational achievement."

Nomvula holds a BSc Degree in Chemistry and Zoology from the University of Fort Hare; a BSc (Honours) Degree in Water Utilisation from the University of Pretoria, and a Masters Degree in Environmental Management from North-West University.

She started working as a chemical analyst in the then Springs City Town Council from 2001 to 2003. Thereafter, she was appointed as the Water Quality Officer until 2009. In 2009, she got an opportunity at the City of Johannesburg as a programme manager. Here her role was to provide strategic input, oversight while playing a regulatory role to monitor Johannesburg Water.

Since then she has been climbing the ranks steadily at the metropolitan municipality; being first appointed as an Assistant Director: Policy and Strategy in the Water Services Regulation department, and now as Unit Head: Water Services Regulation and Policy Development.

Her daily duties now include managing, leading and directing the water services policy development and regulation function at the City of Johannesburg in order to ensure the sustainable implementation of water services. She also has the responsibility of setting water services strategies and to facilitate these into the City's planning and coordination processes in partnership with external and internal stakeholders.

"I have literally grown in the City of Johannesburg. I have knowledge of strategic planning, project management, monitoring and evaluation, financial management, budget planning, policy and strategy as well as research and sustainability," notes Nomvula. Driven by her vision for the city, Nomvula offers extensive experience in the determination, implementation and formulation of action plans to identify and deliver upon organisational and societal demand.

With reason, Nomvula is very proud of her achievements, but her daily working life is not without its challenges. She has found that some of the deliverables in terms of what is required from the Department of Water and Sanitation in terms of water quality compliance are cross-cutting and affect other municipal departments, such as billing and revenue, risk, customer relations and the social department.

"It has been challenging initially to garner support from some of these departments," she says. "However, with consistent communication and by highlighting the significance of their participation has ensured that the City of Johannesburg achieve Blue Drop certification."

Nomvula has to build various networks in order to achieve her goals. She singles out her relationship with Johannesburg Water. "The working relationships I have with them, and that interaction has contributed to where I am today."

She also praises Antonino Manus, who has opened up opportunities for her to network with organisations, such as the WRC and the CSIR, where she has acquired more knowledge to apply in her daily work.

Water is a scarce resource in South Africa, and the need to use water sparingly and reuse water where possible must be instilled in especially Gauteng communities through education and awareness. "It is only in this way that we can hope to achieve water-centred economic growth," notes Nomvula.

One must have passion to work in the water sector, it is so much more than 'just a job'. "To succeed in this sector one must be willing to learn continuously and think creatively to come up with the solutions that will solve South Africa's water challenges."



Nomvula Mofokeng has dedicated her professional life to ensuring clean water to the residents of Johannesburg.



CHAPTER 2

At the forefront of water research and innovation

“Don’t let anyone rob you of your imagination, your creativity, or your curiosity. It’s your place in the world; it’s your life. Go on and do all you can with it, and make it the life you want to live.”

Mae C. Jemison (first African-American woman astronaut)





NOZI MJOLI

Growing up in a rural community in Umzimkulu, in the Eastern Cape, has given Dr Nozi Mjoli first-hand knowledge of the challenges associated with lack of access to basic services. She has dedicated her life to the improvement of the lives of those less fortunate in South Africa.

When Nozi completed her B.Sc Degree and a University Education Diploma at the University of Fort Hare in 1977, she opted to teach Biology at high school level. But, she found that she was stagnating and teaching was not her proverbial cup of tea. She decided to return to university where she completed a BSc (Hons) in Zoology with the support of a CSIR bursary. After serving a short stint at the newly-established University of Bophuthatswana, Nozi studied towards her MSc (Microbiology) at the University of Notre Dame, USA, which was funded by a Fullbright Scholarship. After the completion of her Masters degree the university offered to fund her PhD studies, which she completed in 1987.

Upon her return to South Africa she worked as a researcher at the University of Cape Town and the CSIR. She was also a senior lecturer in Microbiology at the University of Durban Westville. Here she introduced a Seminar programme for final-year Microbiology students, which motivated many students to obtain their PhD degrees in Microbiology.

“There is so much work still to be done to empower and encourage women and poor communities to be active participants in the development process.”

In 1995, Nozi became the first African woman to be appointed in a managerial position at the WRC. Although the environment was initially less than enabling, Nozi took the decision that she was going to make a success of her career in the water sector. As the research manager responsible for research projects relating to the provision of water and sanitation for unserved communities she was committed to improving the lives of all those millions of South Africans who lacked access to water and sanitation services prior to the country's democratisation. Among others, she introduced a theme on gender and water and sanitation as she believes that women have an important role to play in sustainable water management as mothers, managers of their households and citizens.

The international recognition of Nozi's contribution to the water sector has seen her represent women – and the country – on a number of bodies and fora, such as the Water Supply and Sanitation Collaborative Council, the United Nations Development Programme, and the Global Water Partnership.

She was instrumental in incubating and catalysing research and development in the subject area of water supply and sanitation for marginalised and poor communities. This was achieved in a very difficult environment dominated by years of First World science. Her research output resulted in policy change in this area. Nozi was later appointed Director of Water Resource Management at the WRC and she was responsible for the development of the first strategic plan for this key strategic area.

In 1999, Nozi was appointed by former Minister of Water Affairs and Forestry, Kader Asmal, as chairperson of the National Water Advisory Council. In 2003, she formed her own consultancy, Hlathi Development Services, where she continues to campaign for the improvement of the living conditions of South Africa's most vulnerable communities.

According to Nozi, her job is far from done. “I believe there is so much work still to be done to empower and encourage women and poor communities to be active participants in the development process rather than continue to be treated as passive recipients of charity.”



UNATHI JACK

Engineering technologist, Unathi Jack, has dedicated her career to develop tools to help municipalities deliver better services to their constituents.

Born in Butterworth, in the Eastern Cape, Unathi grew up as the third child of five from her parents who were both teachers. She matriculated at Colosa Secondary School in 1994.

She explains how she only went to university a year after completing her schooling. "I had an unplanned study break and stayed at home with my university entry exemption certificate because I did not timeously apply for admission to any tertiary education institution. Stupid as it sounds, that was how lacking or insufficient our exposure and guidance were in our home and school environment at the time."

She did eventually enrol with Peninsula Technikon (today known as Cape Peninsula University of Technology) to study Chemical Engineering. She traces her current career path to Dr Ed Jacobs of the University of Stellenbosch whom she joined for her experiential training in the last year of her engineering diploma in 1999. "This was the beginning of my exposure to membrane water treatment technology development and the water treatment field in general."

It was during this time that Unathi was inspired to undertake a B-Tech Degree in membrane technology. "With some influence from Dr Jacobs and my supervisor, Bruce Hendry, I continued to complete an M-Tech Degree, undertaking research focusing on the development of externally unskinned ultrafiltration membranes for water treatment. My love for the water field grew more as I was exposed to different fields in the sector."

"Understanding and leading on matters related to water is of vital importance in the human life. In most communities it is exclusively the responsibility of women to ensure that there is adequate and safe water at their homes for family livelihood."

She joined private firm, Emanti Management, during the last months of her M-Tech and has worked there ever since. The team involved her actively in their water and wastewater projects from the start. For example, she was team leader for a WRC project that investigated the status of wastewater ponding systems in the Free State and North West. "I got exposed to and involved in a number of projects afterwards where I had to work mainly with municipalities, the DWS, the WRC, and the South African Local Government Association, among others."

Today, she is not only an employee of Emanti, but also a shareholder. She has a host of key responsibilities, including the development of risk assessment tools and water services-related guidelines; assessment of drinking water and wastewater systems; and analysis and interpretation of water quality data and wastewater effluent quality. She also assists in conducting environment impact assessments and assisting clients to understand and implement the relevant policies, regulations and strategies.

In addition, she is a certified Green Drop Lead Inspector, and assists municipalities with Blue and Green Drop compliance. She also assists municipalities with the development of water safety plans and wastewater risk abatement plans.

Having such a diverse portfolio has made Unathi realise that you cannot be an expert on everything. She has learnt to consult, ask and tap into others' expertise and so learn more. "I talk to people who may have the expertise when I need assistance and I am honest when I do not know something."

She has had various mentors in her life, but singles out former WRC Executive Manager, Dr Heidi Snyman. "She was the research manager on my first WRC project in my first year of employment. She taught me to always focus on what I want to achieve. In her gentle, yet firm approach, she taught me never to limit myself but to feel free to go wide, deep and high. Her guidance through that project has enabled me to go forward and do more."

When asked about her career highlights she says: "Every time I am involved in development of a guideline document through the WRC projects, the latest developed guideline document becomes my greatest achievement," says Unathi. "The piece of work I, however, consider the greatest is the involvement and development of an Emergency Response Plan guideline document. This guideline was developed for small, rural communities to be able to plan for anticipated water systems failures and develop response plans to water services related emergencies."

Making a living in the water sector is not work, or a job but life, Unathi believes. This is especially important for women to realise. "Therefore they should behave in their natural way as they do in other aspects of life (i.e. willingness to advise, share experiences, lend a hand, listen, etc.). Women should make it their responsibility to talk and bring about awareness at their social clubs, churches, etc. Women have a responsibility of caring for their families and more importantly are closer to children than men. Understanding and leading on matters related to water is of vital importance in the human life. In most communities it is exclusively the responsibility of women to ensure that there is adequate and safe water at their homes for family livelihood."

What advice would she give young woman looking to have a career in the water sector? "Do you want to be a step ahead of a doctor? Then prevent while the doctor provides a cure. This is a field meant for young women who are life carriers, life nurturers, life supporters. It is their natural given trait, they must just realise and practise the role."



ALISON LEWIS

Alison Emslie Lewis is Professor and Dean of the Faculty of Engineering and the Built Environment at the University of Cape Town (UCT) – the first woman at the university to receive such an appointment.

Alison graduated with a BSc (Chemical Engineering), MSc (Chemical Engineering and a PhD, all from UCT. She is a Professional Engineer, registered by the Engineering Council of South Africa. She is also a Fellow of the British Institute of Chemical Engineers (FIChemE), the South African Institute of Chemical Engineers, the South African Academy of Engineering, the South African Institute of Mining and Metallurgy and UCT's College of Fellows. In addition, Alison is a Member of the Academy of Science of South Africa.

A publisher of more than 120 international journal and conference papers, Alison has an international research reputation. She has also been recognised locally for her achievements. She has a string of awards to her name, including the National Research Foundation President's "Champion of Transformation in Research" Award in 2012 for her active involvement in training, fostering and mentoring formerly disadvantaged students. In the same year she also won "Distinguished Woman Scientist" award from the Ministry of Science and Technology for her outstanding contribution to building South Africa's scientific and research knowledge base.

"There are opportunities and a huge potential for students, graduates and engineers to start getting involved in solving water problems."

Alison takes capacity building in the sector very seriously. She has supervised 37 Masters and PhD students to graduation, published more than 120 international journal and conference papers and has established an international research reputation.

Says Vice-Chancellor at UCT, Dr Max Price, about Alison: "Known for her ingenuity and innovative approach, Prof Lewis has facilitated projects such as the new curriculum project and the Assistant Lecturer programme, which enables postgraduate students to develop teaching skills which could make them potentially employable in academic positions once they have completed their studies. She has also championed transformation initiatives by establishing four new academic posts in the department, three of which have been filled by black South Africans."



Prof Lewis with some of her students.

Her unit is involved in research and development that leads to cleaner products made by cleaner processes. Specifically they are involved in precipitation and crystallisation research, mainly connected to the mineral processing industry.

"I have always had an interest in both environmental and water issues, which is why I pursued water treatment subjects in my postgraduate degrees," notes Alison. "However, when I started the research unit, I was told that it would be difficult to get funding for research in water and was advised to undertake research on the actual processes involved."

As a result, Alison got involved in research in platinum and rhodium precipitation and crystallisation, but always kept an interest in water treatment alive, mostly through projects related to the treatment of acid mine drainage. The topic of water treatment has been a constant theme through the research that she has been involved in. Since 2001, she has raised R52-million in research funding.

In 2007, she and her team started their work in eutectic freeze crystallisation, which is a novel technology for treating acid mine drainage and hyper-saline brines. "That has been a very exciting innovation in water research in our laboratory," she says.

Concludes Alison: "I think there are huge challenges in the water sector. What is interesting is that chemical engineering used to draw a lot of students who were out to get a professional degree and make a good living. Now there is a new group of students who are committed to using their degrees to solve the pressing global challenges of the day – and one of these is water. There are opportunities and a huge potential for students, graduates and engineers to start getting involved in solving water problems."





(Photo credit: CSIR)

CHANTEL PETERSEN

Chantel Petersen specialises in fluvial geomorphology research at the CSIR.

She has experience in riverine ecosystems, which includes fluvial geomorphology, aquatic ecology (macro-invertebrates) and river health. "The importance of ecological infrastructure (such as riparian zones) within a landscape and its effect on river geomorphology is also an area of interest, especially in terms of the key benefits it can provide in terms of ecosystem services for freshwater systems, and therefore also for river ecosystem management and conservation."

Recent projects she has been involved in includes projects related to freshwater and estuarine biodiversity conservation and GIS mapping as well as using GIS as an application and analysis tool in these fields. She has also been part of research teams undertaking research related to urban river management, environmental water requirements for surface water and ecological infrastructure.



"Young women must capitalise on the opportunities that are offered to them. They must show commitment and initiative but most importantly they must believe in their own abilities and have the confidence to be different and to make a difference."

JANINE ADAMS

Janine Barbara Adams is a professor at the Nelson Mandela Metropolitan University in Port Elizabeth. She completed her PhD here and started as a lecturer, progressing through the ranks to become a professor. Her specialist research field is on coastal ecosystems, their functioning, conservation and management.

As an expert on estuarine ecology and management, Janine was appointed team leader of the Department of Water and Forestry Estuarine Reserve Group in 1999. This group was responsible for testing the methodologies for Ecological Reserve determination to allow the implementation of the National Water Act. Janine also coordinated a number of environmental flow requirement studies on estuaries for the department.

Today, she has over 70 publications in highly rated journals and is an NRF-rated scientist. Current research areas focus are the freshwater requirements of estuaries, water quality management of coastal habitats and responses to climate change.

Janine regularly interacts with managers and practitioners, and is highly respected in government and non-governmental organisation circles in the water sector. She served as Chairperson of the WRC (2009-2012), was President of the Southern African Society of Aquatic Scientists (2012-2014) and is a fellow of the Royal Society of South Africa.

Janine's advice to young women in the water sector is that hard work, enthusiasm and always going the extra mile will pay off in the end. "Young women must capitalise on the opportunities that are offered to them. They must show commitment and initiative but most importantly they must believe in their own abilities and have the confidence to be different and to make a difference."

She advises women to take opportunities that are provided by affirmative action. She feels that women in senior leadership have the potential to become transformative in positive ways because they have different skills that can be applied in solving conflict. Women leaders need to support other women by encouraging them so that they know that career progression is achievable. Senior women could also act as role models and help other women to identify their career paths.



“Transfer of knowledge and development of skills remains the most critical challenge, especially in rural areas. The sustainability of water resources in this water-scarce country will depend on the involvement of young people in the water sector.”

MAGGIE MOMBA

Even as a child in her birth country the Democratic Republic of Congo (DRC), Prof Maggie Momba was concerned with the quality of drinking water when she experienced the taps in her home often spewing brown water and earthworms.

Her search for the sources of water contamination led Maggie to a science degree from the University of Kisangani, and later to Clark Atlanta University, in the US, where she studied the management of natural resources and the protection of the environment.

In 1993, she joined the University of Pretoria where, for the first time, she was offered an opportunity to be involved in the optimisation of water and wastewater treatment. After completing her Masters Degree in 1995 and her PhD in 1997, she joined the University of Fort Hare.

Her research projects conducted here focused on, among others, groundwater and surface water used for domestic purposes. These projects were aimed at examining the risks associated with microbiological hazards in order to, firstly, establish whether exposure to microbiological agents add to increase in water-related diseases in the Eastern Cape; secondly, to raise community awareness of the microbiological quality of drinking water sources and, thirdly, to develop strategies to ensure sustainable and effective treatment of drinking water.

Under her leadership, researchers from the universities of Fort Hare and KwaZulu-Natal, with Umgeni Water investigated the cause of inadequate disinfection at the Alice Water Treatment Plant. Despite initial resistance from the local municipality, she convinced them, through extensive dialogue and diplomacy, to work with the researcher at establishing a much improved water treatment facility. This collaboration also led to the training of water treatment plant operators as well as guidelines for small municipal water treatment plants.

In spite of a heavy teaching load, she established a research programme on water quality management in the Eastern Cape. This research programme led to the establishment of one of the largest black post-graduate programmes at the historically black university. More than twenty BSc Honours and Masters students, many of them women, have already completed their degrees under her supervision.

Another career highlight for Maggie has been the establishment of the modern molecular diagnostic laboratory at the University of Fort Hare. This resulted in the introduction of novel molecular study at undergraduate and post-graduate levels at the university.

Maggie is now working at the Tshwane University of Technology as a research professor in the Department of Water Care. Her present research activities are focused on, among others, environmental biotechnology (the use of microorganisms to inhibit water pollution); water and wastewater use (health-related water microbiology); and on-site training of small rural water supply operators.

According to Maggie, her current post allows her to spend more time on water research while building capacity, not only for South Africa but also for the continent in terms of Doctoral and Masters students. "Lack of skills in water and wastewater management has a negative impact on the health of the people of this continent and, consequently, on the growth of the economy. We need to pay much more attention, therefore, to the creation of additional capacity."

Apart from winning the Women in Water Award in 2005 in the research over 35 category, she also received the Vice Chancellor's senior research medal at the University of Fort Hare in the same year. In 2004, Maggie won an award for 'Outstanding Community Support' organised by the Second International Conference on Safe Water, held in Johannesburg.

"The water industry in South Africa offers great opportunities," she says, "however, transfer of knowledge and development of skills remains the most critical challenge, especially in rural areas. The sustainability of water resources in this water-scarce country will depend on the involvement of young people in the water sector."



(Photo credit: CSIR)

JACKIE DABROSKI

Jackie was born in Johannesburg, which is where she was educated. When she left school, she wanted to see the world, so she worked in the travel and tourism industry in order to achieve that.

"During all my travels I saw many beautiful places, but also saw the extent of human impacts on the natural environment everywhere I went. I decided that to be part of the solution I needed to change my career focus. I phased out my career in travel and enrolled at university." She was in New Zealand at the time, and began her BSc at the University of Canterbury in Christchurch. She concluded her studies eight years later at the University of Pretoria, having obtained a PhD in Veterinary Science.

According to Jackie her study programme in New Zealand had a very strong focus on freshwater ecology, and she learnt the fundamentals of rehabilitation, monitoring, and ecology of these ecosystems. She returned to South Africa to complete her post-graduate studies, and got involved with the CSIR as an MSc student with a large multi-disciplinary project aimed at determining the impacts on water quality in the Olifants River.

"My role in this project was to investigate the possible causes of pancreatitis in fish and crocodiles in Loskop Dam. This project also formed the basis of my PhD and involved researching many aspects of the ecosystem ranging from water chemistry to endocrinology and food web ecology," explains Jackie.

Jackie has since joined the CSIR on a permanent basis and is now a senior researcher. Her current work revolves around environmental water quality. She generally focuses on how water resources respond to various inputs and environmental changes. She is particularly interested in the effects of drought on water quality, and the analysis of long-term trends.

To date, her greatest challenges has been the fieldwork she undertook for my post-graduate studies. "The hours were long, the work was dirty and very difficult, and often took place in scorching sun, howling winds, or driving hail and rain. At times, boats broke down, cars broke down, or equipment broke down. Although I had a lot of help from colleagues, I did a lot of it alone. However, completing this

fieldwork was also my greatest and most enjoyable achievement to date. I thoroughly enjoyed my time in the field and relished having to overcome the challenges that each day would bring.”

As a woman in the water sector, Jackie doesn’t see her role as being unique to a man’s. “Water is critical to our survival, and therefore it is our collective responsibility to preserve and conserve it in whatever way we can. Education is critical and begins with our own children. Many do not even realise that the water in our taps comes from rivers and reservoirs, and therefore make no connection between their drinking water and environmental health.”

According to Jackie, she has been fortunate to marry one of her great mentors in the water sector, James Dabrowski – a senior researcher with the CSIR. “My husband and I have many in-depth conversations about our work, and he constantly challenges and inspires my work. I was also very fortunate to work with Peter Ashton before he retired from the CSIR. He had a great gift for simplifying complex issues with elegant language.”



Jackie taking sediment samples with researcher husband, James.

Jackie points out that we all have a role to play, from switching off a dripping tap, to ensuring that water use licenses are adhered to. Many of the sectors that greatly impact water quality such as mining, industry and agriculture tend to be male dominated. This can be intimidating, which means it is important that discussions revolve around facts and good science.

She advises budding water scientists to align themselves with a suitable mentor and learn as much as possible from them. “Water is a very complex subject, so develop networks and talk to lots of people. It is impossible to be an expert in everything. Tackle relevant issues where your work can have real impact and meaning.”



DANNY GOVENDER

With her slender frame and quiet demeanour, Dr Danny Govender is hardly the person you would associate with wrangling wild animals.

It was her profound passion for nature, a love for learning, and a desire to live a fulfilling life, which prompted her to pursue a career in conservation. “The desire to be a veterinarian in conservation was prompted by a desire to heal and restore components and processes in our natural world that affect us on so many profound ways; from very basic human needs provision to deep psychological fulfilment.”

Danny grew up in Marianhill, a small village in KwaZulu-Natal. She describes how her family was relocated during the Group Areas Act from Old Main Road, Pinetown, to what was then considered farmlands. “It serendipitously proved an almost idyllic way to grow up; away from the bustling city and in a large extended family.”

This cemented her love for nature and rural living. Her primary and secondary education was achieved at local schools. She went on to complete a BSc Degree at the University Durban Westville (initially hoping to major in Marine Science). Danny then went on to complete a

“Women’s ability to take on diverse roles throughout society’s evolution has put them at the forefront of being dynamic, natural leaders.”

Bachelor's Degree in Veterinary Science and a Master's Degree in Tropical Animal Diseases at the University of Pretoria.

She started her career at South African National Parks (SANParks) as a clinical wildlife veterinarian. Here she did a great deal of game capture. "It was a great four years of working in a brilliant team of talented and skilled individuals and it certainly was exciting work."

However, Danny realised that her love for science (especially the science behind the decision-making in the organisation) and the role of conservation areas in larger civil society was pulling her towards the coal face of the science mechanism in the organisation and how that science got translated to management. In 2008, she got transferred to the research department where she still works.

Her passion in finding the connection and contribution of conservation areas to civil society has meant that her work has centred around freshwater ecosystems where the interconnectedness is more obvious and where putting a fence around a protected area does not change the fact that there are diverse users in a catchment. "We are all impacted by each other," Danny says.

Today, Danny is Science Programme Manager/Scientist at SANParks, particularly dealing with Disease Research (which covers both infectious and non-infectious diseases, such as pollution). "Our roles as organisation scientists are quite unique in that we conduct our own research and monitoring as well as facilitate external research on identified research priorities in addition to novel theory and experimentation," Danny explains. "I am very involved with various aquatic ecosystem health projects, using bio-indicator organisms from crocodiles to diatoms to fish to mosquitoes to understand how the physical matrix of water quality, water quantity and habitat affect different levels of biotic organisation."

Her greatest achievement has also been her greatest challenge, notes Danny, that is, to be heard and recognised in a sector largely dominated by white males to the point where she was seen as a competent individual and not a "female-Indian-competent" individual. "I don't think we are completely there, but we have made huge strides in recognising women in the workplace in this country."

Despite the challenges she has experienced in her career she strongly believes that women have a place in the water sector. "Women remain the backbone of South African society. From nurturers to career women, their ability to take on diverse roles throughout society's evolution has put them at the forefront of being dynamic, natural leaders. What we need in the water sector right now is this crop of dynamic, thoughtful and selfless leaders."

Her advice to young women in the sector is: "Persevere, persist and enjoy what you do! No one can define what you can bring to the workplace. You are a unique individual who is going to make a unique and needed contribution through your career, don't be afraid to be that person."



Danny taking blood samples from a diseased crocodile in the Kruger National Park.



"Pursuing studies in agriculture and water-related fields was natural for me as it allowed me to solve real problems through working for the betterment of rural communities."

BONGANI NCUBE

Life has taken Dr Bongani Ncube on an exciting journey in her pursuit to uplift particularly smallholder farmers.

Bongani was born in Matobo, south of Bulawayo in Zimbabwe. She attended various schools, matriculating at Northlea High School, in Bulawayo. She went to study at the University of Zimbabwe, where she graduated with a BSc Honours in Agriculture (Soil Science) in 1994.

Following graduation she worked as an ecologist in the Zimbabwean Ministry of Environment and Tourism where she undertook research and environmental monitoring. In 1998, she applied for a scholarship to study for an MSc in Water Resources Engineering and Management at the University of Zimbabwe. This she completed in 2000, and then joined the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) as a Scientific Officer. In 2003, she got the opportunity to pursue a PhD in Production Ecology and Environmental Conservation with Wageningen University in the Netherlands, which she passed with flying colours in 2007.

She sees achieving her PhD as her greatest achievement to date. "I think I made a difference in the lives of the farmers that I worked with, while achieving a lifetime dream." Being a woman in a traditionally male-dominated field of study has not deterred her from pursuing her goals. "I have always studied and worked in male-dominated environments. My biggest challenge is not being taken seriously and being looked down upon to the extent of earning less than men, just because I am a woman. It is a continuing struggle, but my biggest weapon so far has been doing my job well and proving that I am not just a woman, but I am a human being."

When asked why she pursued this field she explains: "I was born in the rural areas where livelihoods were mainly based on farming. Pursuing studies in agriculture and water-related fields was natural for me as it allowed me to solve real problems through working for the betterment of rural communities. Carrying out research in these fields also keeps me outdoors, where I am able to enjoy the natural beauty of the world while pursuing a career that I love. My career has taken me to interesting parts of the world, and while travelling I am always inquisitive about how rural communities make their living."

Bongani worked for WaterNet as a Research Leader in the Challenge Programme on Water and Food, which covered both water and agriculture in the Limpopo Basin (covering South Africa, Mozambique and Zimbabwe). Towards the end of 2009, she travelled to the UK where she got a job at a small non-profit organisation, Excellent, which has made a big difference in providing water for smallholder farmers in rural Kenya. "I had memorable trips to rural Kenya. I remained in the UK until 2012. I then got an opportunity to return to Africa at the beginning of 2013, and I joined the Cape Peninsula University of Technology (CPUT) in Cape Town as a researcher," notes Bongani. In addition to being a researcher, Bongani also lectures Soil Science in the Department of Agriculture at the same university. Her research covers both water and agriculture. "I recently completed a WRC project on drought adaptation in agriculture in the Karoo. I am also leading a project on emerging farmer participation in water allocation reform in the Breede-Gouritz Catchment Management Area. I also have research linkages with the Department of Agriculture. We are continually building collaboration and so far the results have been good, the farmers are walking with us. Above all we are making progress in building capacity through training young students and interns, who I see as the future for South Africa."

She feels blessed to have had many mentors and inspirational people along her journey. First there was her mother, who, while not having the same opportunities inspired and encouraged Bongani to work very hard. She credits her own resilience with her mother's teachings. Further in her career she has come across women who have taught her how to conduct herself in a male-dominated field. "They speak the language that is making a difference to the girl, mother, and man in the village, they are solving real water problems, and to me that is impact! I have worked with many inspirational men too, many that supported my studies and research."

Bongani continues: "My first degree lecturer, Ms Catherine Verbeek, Dr Mary Mgonja at ICRISAT, Dr Graciana Peter at WaterNet and Ms Eiman Karar at the WRC are my mentors. These women stand out for me through their hard work and grounded characters as women and mothers. I am also inspired by the Minister of Water and Sanitation, Mrs Nomvula Mokonyane, and her deputy, Mrs Pamela Tshwete. They are hands-on ladies."

She feels that more women should become involve in the water and sanitation sector. "Women need to be present, to listen and to act. If all that fails women should make a lot of noise until their voices are heard!"

Bongani believes that nothing can stop young women from becoming who they want to be in this field. They may face challenges and discouragement, but they should never look down upon themselves. The biggest weapon in this field is to work hard, with integrity and honesty.



SHARON POLLARD

Dr Sharon Pollard has through her dedication and perseverance in difficult times and in a challenging area of work, managed to make a considerable contribution to advancing water resources management, especially in the Lowveld area of South Africa.

Her skills, competence and professionalism have made her a sought-after scientist in the water sector, both nationally and internationally. Despite being presented with a number of opportunities to move into more financially lucrative positions and so benefit personally, she has chosen to continue working in the north-eastern part of the country where poverty and inequity to access resources remain a serious concern.

"Water is linked to our spiritual sense of who we are; it permeates all aspects of our lives."

At present, Sharon is the Executive Director at AWARD (Association for Water and Rural Development). AWARD is the only non-governmental organisation in South Africa working in an integrated way in terms of water resources and water supply. It is unique in that it seeks to embed issues of water supply, within the broader context of water resources and their wise use.

"Water is an amazing integrator of human and ecological systems. Studying water draws you out of science into the social and political world because of the way that water is linked to our spiritual sense of who we are; it permeates all aspects of our lives."

Sharon is conducting pioneering research and advocacy work around water supply in underprivileged areas in South Africa. She has a strong background in the water sector with a special focus on integrated catchment management planning and implementation. She has managed many internationally recognised projects and continues to work in the area of water for productive use, looking at the role that water plays in economic development in poor rural communities. Her special focus is on planning for meeting water requirements for sustaining ecosystems. One of the innovative projects she initiated was the Save the Sand project, which looked to improve the ecological integrity, productivity and water resources of the catchment.

Another project led by Sharon was the Shared Rivers Initiative, an action-research programme initiated in 2007. Among others, the programme has set out to explore the progress towards meeting the commitment to sustainability of South Africa's Lowveld rivers as set out in the National Water Act. For this project Sharon became one of the first recipients – and the first female award winner – of the WRC Knowledge Tree Awards in 2013.



BARBARA TAPELA

Dr Barbara Nompumelelo Tapela is a senior researcher with broad expertise in applied social research, policy engagement, community engagement, stakeholder participation and stakeholder analysis.

She was born in the small border town of Plumtree, Zimbabwe. The first five years of her life was spent at Thekwane Mission, to the north of Plumtree, before her family moved to Pelandaba Township in Bulawayo, where she grew up. "It was here that I became sensitised from an early age to the socio-political dynamics of the time," she says.

Barbara completed her tertiary education at various academic institutions, including the University of Zimbabwe, University of Venda, University of Pretoria and the University of the Western Cape. She currently holds a PhD in Land and Agrarian Studies from the University of the Western Cape.

She explains that her interest in the social, political economy and governance aspects of water resources management issues began during her undergraduate studies at the University of Zimbabwe, where she studied hydrology among other courses. "My fledgling dissertation then comparatively analysed the socio-political impacts of land use on water quality in two urban streams that flow through Bulawayo," she explains. "Later, in the 1980s, when I worked as an ecological research officer for the Department of Natural Resources of Zimbabwe, much of my work was concentrated within the Zambezi River Basin."

These required a conscious shift away from the narrow ecological perspectives that dominated the water and natural resources management sectors of the time. This sentiment became reinforced during Barbara's subsequent years in Botswana and Limpopo, where the rural poor, particularly women and vulnerable men, daily contended with challenges of access to water and land for livelihoods.

"While commendable achievements have been made to promote gender parity within the water and sanitation sector, the greater majority of South African women are mostly confined to the more basic roles, with a relatively small number involved in the more strategic roles."

Barbara notes that, not only did she get exposure to the SADC-led Zambezi Action Plan 2 during this time, but her research raised a lot of social/socio-political, political economy and environmental questions around the allocation and use of water resources.

Barbara currently works as a senior researcher at the Institute for Land and Agrarian Studies (PLAAS), at the University of the Western Cape. Her research revolves around the gendered social aspects of integrated water resource management, including water and sanitation services, in rural and urban contexts.

Among others, her research interests include land tenure, tenancy and water and sanitation delivery in South Africa; water-related social protests; rural development, resilience and the governability of water-linked ecosystems in transitioning rural economies; water governance and gender in traditional rural communities; the contribution of inland fisheries to rural livelihoods; and the livelihood impacts of agricultural commercialisation in smallholder irrigation schemes.

In her own words, Barbara's greatest achievement to date has been the tenacity to overcome multiple obstacles and continue to pursue her heartfelt mission to make whatever difference is possible in the lives of fellow humanity, particularly those disadvantaged by the imperfections of our difficult moment in history. "Such tenacity can never be ascribed to my own strength alone."

Her greatest challenge as a researcher is in ensuring that critical study findings influence policy and contribute to enhancing water sector planning and practice. Although research uptake in these domains generally falls outside the scope of a researcher's field of operation, the challenge is constantly to find effective ways of engaging with policy within an ever-changing milieu of social, political and economic contexts and dynamics.

"In particular, the emergence after 2009 of new political mobilisations, mainly within civil society, following perceptions about the closure of 'invited spaces', has heightened the need for robust policy engagement strategies," maintains Barbara. "Key cornerstones of my approach to dealing with the challenges of policy engagement have included recognising the ethos underlying the South African Constitution's Bill of Rights, striving towards rigour and excellence in research, valuing the multiple viewpoints of stakeholders, learning from others and finding new ways and opportunities to engage with key stakeholders. This is always a work in progress."

Water and gender is a subject close to Barbara's heart. "Water and sanitation are critically important to women's productive and reproductive roles within households and communities, and within the broader economy. However, while commendable achievements have been made to promote gender parity within the water and sanitation sector, the greater majority of South African women are mostly confined to the more basic roles, with a relatively small number involved in the more strategic roles."

Within rural and urban informal water economy contexts, women's contributions to water and sanitation services is often under-valued and/or unrecognised. The costs these women incur in dealing with the negative impacts of poor water and sanitation services on health, hygiene, dignity, employment, income and well-being are often unaccounted for.

"Contributions to the water and sanitation sector by women in informal economies should be appropriately recognised," maintains Barbara. "In general, women should be empowered to play greater decision-making, research, policy implementation and entrepreneurial roles in the water and sanitation sector. Short of these interventions, it might be difficult to meet some of the more poignantly-felt expectations of the majority of historically disadvantaged South Africans, let alone to achieve the sustainable development goals."

Barbara has the following advice for young women aspiring to a career in the water sector: "There is no substitute for hard work, pushing the boundaries of existing knowledge and dedication to strengthening the water and sanitation sector, and thereby the resilience of gendered livelihoods, particularly but not exclusively for disadvantaged women and vulnerable men."





“Young scientists should not lose sight of the challenges that integration and scale-up present. There are also many issues such as toxicity and ethical dilemmas that arise from the applications of nanomaterials which need to be resolved before such materials are released into the marketplace.”

LESLIE PETRIK

Leslie Petrik is an Associate Professor in the Department of Chemistry at the University of the Western Cape (UWC). She has been involved in nanoscience research for more than 20 years.

At present, she leads the environmental and nanoscience (ENS) group, which is involved in post-graduate research in nanoscience and nanotechnology, as well as environmental remediation. Over the six years that the group has existed under Leslie's leadership, more than 60 (including Masters and PhD) students have graduated from ENS programmes.

Leslie has focused primarily on environmental remediation and nanotechnologies for water purification and waste remediation, with a specific emphasis on how nanotechnology may be beneficially applied in this field. Recent breakthrough technologies, which she has patented show how low-cost nanostructured adsorbents can be prepared from waste fly ash, and applied to remove toxic metals and other pollutants from water, how organic pollutants and problem bacteria in water can be completely decomposed and destroyed in a simple, one-step process using a electrohydraulic discharge system, and how fly ash can be used to treat and purify acid mine drainage from coal and gold mining.

“Nanoscience offers the opportunity to design and engineer functional materials at the nanoscale, but these materials need integration up to the macroscale to become useful,” she explains. “Young scientists should not lose sight of the challenges that integration and scale-up present. There are also many issues such as toxicity and ethical dilemmas that arise from the applications of nanomaterials which need to be resolved before such materials are released into the marketplace.”

Since 2008, Leslie has published seven patents, eight book chapters and more than 48 (out of a total of 67) scientific papers in internationally accredited journals. Leslie is a reviewer for several international journals and NRF grants and ratings. Her work has attracted numerous research grants and resulted in collaboration with several international research organisations and universities in the USA, Russia, Finland, Poland, Turkey and France.

Leslie was a winner of the Department of Trade and Industry's technology award in the THRIP (Technology and Human Resources for Industry Programme) Quality and Quantity of Students category in 2010, and runner-up of the Department of Science and Technology Women in Science Award in 2012 in the Physical and Engineering Sciences category. In 2013, Leslie received the UWC Vice Chancellor's Annual Distinguished Researcher Award, in the Natural and Medical Sciences. The award is given to researchers who bring honour to the university through their cutting-edge work.



LYNETTE BARATTA

Dr Lynette Baratta has always had a scientific-oriented mind. She is living proof that water has a place anywhere, even in the petrochemical industry.

Lynette grew up in a small town outside Pietermaritzburg, called Cool Air, Dalton. After matriculating from Cool Air Secondary School, she completed a BSc Degree at the University of KwaZulu-Natal, majoring in Chemistry and Biochemistry followed by an Honours degree in Chemistry.

“We need to look at sustainability of current resources, educate the public regarding the scarcity of this precious resource and develop innovative ways on how we could manage the current shortage and plan for future requirements.”

“Afterwards I commenced with a Master’s Degree in the School of Chemical Engineering within the Pollution Research Group. My studies focused on treated highly concentrated brines via membrane processes, specifically membrane distillation. I upgraded my Master’s to a PhD which I completed in 2006, at which point I began my career as a scientist at Sasol,” she explains.

She adds that: “After the first year of University I realised that I enjoyed chemistry and it intrigued me. It was then clear as to what career path I should follow. Entering the environmental field during my postgraduate study really opened up a new dimension of thinking for me, which for me was a practical and realistic area of science which I could relate to and could see myself contributing significantly.”

She joined Sasol as a candidate scientist in 2006. First entering a huge petrochemical manufacturing facility and actually seeing science in action was quite daunting for the young graduate. Lynette says that the first couple of years were a steep learning curve. It is one thing to succeed at university and get your qualification, but the real challenges begin in the working environment where you have to apply your knowledge.



One of Sasol’s biological water processing plants.
(Photo credit: Sasol)

“I worked on a number of projects in the water and environmental field as well as gaining experience in other departments. After these years of exposure to different areas of science I decided to stay with my roots as a water specialist.”

Lynette is currently heading towards her ten-year tenure at Sasol. In her current role as Senior Scientist specialising in water, there are a number of aspects that are encompassed. “Firstly, being within the research and development arena we need to keep abreast with the latest developments in the water field as well as contribute to this area with respect to coming up with new or alternative ways of doing things, developing new technologies and so forth,” she explains. “Secondly, both of our sites have a number of water treatment plants in order to manage effluents on-site as well as ensure adequate clean water to the factory.”

Hence, part of Lynette's responsibilities are to provide specialist support to these plants with respect to troubleshooting as well as optimising current operations. A third aspect of her work is to look into future so-called 'Greenfield' facilities, i.e. new plants. This involves conceptual design of water treatment flow schemes for future facilities.

There is a serious concern with regards to the lack of skills in the water sector at present. More people need to be educated on the fundamentals, and the experts need to be trained as successors for the current legacies in the water and environment field," maintains Lynette. "We need to look at sustainability of current resources, educate the public regarding the scarcity of this precious resource and develop innovative ways on how we could manage the current shortage and plan for future requirements."

Fundamental education is the first key to success in this field. Young graduates, however, need to realise that a Degree is just the beginning of the learning curve. "Solicit the knowledge of peers in the sector who will be able to share their invaluable knowledge of years of experience," Lynette advises. "In this way you can take over the wheel from where it stops and not start all over again."



CHRISTINE COLVIN

With its well-known panda icon, the World Wide Fund for Nature (WWF) is an international non-governmental organisation that works on issues relating to the conservation, research and restoration of the environment. Christine Colvin, Senior Manager of the Freshwater Programmes WWF South Africa (WWF-SA) is leading many of the organisation's water-related initiatives in South Africa.

Christine holds a BSc Honours in Geology, from the University of Southampton, in the United Kingdom, which she acquired in 1989 and an MSc Hydrogeology, University College London, UK, completed in 1994.

"I loved the research environment, the ability to dig deeper into problems and work across disciplines with ecology colleagues."

She provides insight into how she got involved in this sector and some of the milestones of her career. "Travelling in Africa in the early 1990s introduced me to the importance of groundwater in village water supply. This had immediate appeal and as a geologist I had found my niche – hydrogeology. I worked in Namibia on a drought relief programme and learned about drilling and geophysics as the sharp end of emergency water provision in arid environments. After returning to London to complete my Masters I worked in heavily polluted sites in the United Kingdom and Eastern Europe, remediating contaminated land. When I returned to South Africa in 1995 I worked with Dr Gideon Tredoux's groundwater group at the CSIR. I loved the research environment, the ability to dig deeper into problems and work across disciplines with ecology colleagues, such as my mentor Dr David Le Maitre, on the importance of groundwater in eco-hydrology."

After many years in research, Christine wanted to see her work having greater impact and influence decisions that impact water security. "I moved to lead the freshwater programmes at the WWF. Here we are focused on protecting our water source areas, working with business in water stewardship and pioneering new work with the South African National Biodiversity Institute on securing ecological infrastructure for water. We have well established programmes like the Mondi Wetlands Programme and the Water Balance Programme that continue to grow and pilot new ways to include communities in catchment care."

In her current role, leading and coordinating WWF-SA's programmes on freshwater, Christine is responsible for the liaison with the international WWF network, agents of change in the South African water sector, business and key funders. She is also involved in developing a strategy of relevant work with impact for South African water security, as well as ensuring successful delivery, financial sustainability and professional excellence of employees and consultants working on freshwater projects.

Christine is involved in a number of programmes and projects at the WWF-SA, some of these include: South Africa's Water Source Areas, which involves the identification and protection for national water security; the Umgeni Ecological Infrastructure Partnership, a project on the role of private finance in water risk; the Water Balance Programme, involving Nedbank, SonaeNovabord and Woolworths; the De Beers Shared Water Risk and Catchment Security in the Limpopo.

One of the most exciting initiatives Christine has recently been involved in is the Journey of Water. It is all about sharing the complexity of water's journey to people's homes, reconnecting urban users with the natural landscapes that make up their catchments. "Water doesn't come from a tap and we wanted to emphasise the role of nature and healthy landscapes in providing people and the economy with water."



"The diverse nature of the subjects that I had to teach, broadened my knowledge base and hence I feel that I have a reasonable understanding of environmental issues. This is, no doubt, why many of my projects are multidisciplinary in nature."

JANA OLIVIER

Prof Jana Olivier has certainly had a very 'chequered' and interesting career.

She was born in Durban, but due to her father's job, she moved to various places, including Port Elizabeth, Grahamstown, Pietermaritzburg and Johannesburg. She spent most of her high school years in Johannesburg after which she attended the University of the Witwatersrand, where she obtained a BSc Degree, majoring in Zoology and Botany (with chemistry, physics and biochemistry as ancillaries).

Thereafter she taught Biology and Science for a number of years, culminating in a ten-year stint at Herzlia High School in Cape Town. "While I was teaching, I decided to study further and enrolled at UNISA. There, I completed Geography I, II and III, a few modules in geology, maths and statistics and obtained a BSc honours degree in Geography in 1980," notes Jana.

"My first lecturing post at a tertiary institution was at Mmadikoti Technikon in Polokwane (then Pietersburg). No sooner had I moved to Pietersburg, when the technikon was relocated to Pretoria."

After lecturing at the fledgling Vista University during the early 1980s and completing a Master's Degree in Geography (Climatology), Jana accepted an appointment at Stellenbosch University where she lectured physical geography, climatology and environmental management for ten years. While there, she completed a PhD entitled: Hail in the Transvaal: Some geographical and climatological aspects.

Both her MSc and PhD Degrees were obtained on a part-time basis from the Rand Afrikaans University (now the University of Johannesburg) under the supervision and mentorship of Prof Piet van Rensburg. In order to further her academic career, she accepted a post as Associate Professor in the Geography Department at the University of the North (now University of Limpopo) and obtained an NRF rating in 1995.

After taking early retirement in 2000, she was fortunate enough to obtain an appointment at UNISA. Jana retired in 2010 and has subsequently been appointed Emeritus Professor at UNISA (in the Department of Environmental Sciences) and as Extraordinary Professor in the Department of Geography, Geoinformatics and Meteorology at the University of Pretoria.

"Many of my career decisions were prompted by a desire to advance. There were relatively few career options available to women in the 1960s – you married, or became a secretary, a nurse or a teacher. It was also accepted practice that, if you actually obtained an Honours degree, you moved from teaching into the higher education sector. Here again, there was often a glass ceiling, especially in the traditional Afrikaans universities and to advance as an academic and researcher, one had to go where opportunities existed," notes Jana. "I was also fortunate in that many people mentored and advised me along the way such as Prof Piet (my supervisor), Prof Johan van Heerden and Prof Johann Lutjeharms to name a few."

Although Jana is technically on pension, she is still involved in research – the only difference between now and then being that she doesn't have to attend so many meetings and can get up later if she so desires.

One of the most interesting of her recent projects was aimed at determining the optimal use of South African thermal springs. "This was a truly multi- and interdisciplinary research project, with a team of researchers comprising scientists from UNISA, the University of Pretoria, and the Council of Geoscience. The outcome of this research will hopefully contribute to rural economic development."

Another project with which Jana has been involved since the late Eighties is studying the fog phenomenon and how to harvest water from fog to provide water-scarce communities with water. She is also currently a team member of a WRC project aimed at determining the potential hazardousness of cemeteries to human health and the environment (particularly groundwater).



Prof Jana Olivier is currently involved in a research project to determine the potential impact of cemeteries on groundwater quality.

Many might see her varied career as a disadvantage, however, Jana has found it to be enormously enriching. "I have met the most astounding people and learnt much along the way. The diverse nature of the subjects that I had to teach broadened my knowledge base and hence I feel that I have a reasonable understanding of environmental issues. This is, no doubt, why many of my projects are multidisciplinary in nature."

Jana believes that women have a distinct advantage over men in the field of research – especially anything to do with the environment and involving communities. "We have great empathy with rural women and have this rare and precious ability to be able to think laterally (i.e. out of the box)."

She adds: "My advice to young women is to plan carefully what you want to do; to persevere; to be passionate about your research and to enjoy the ride! Good luck."

The background of the page features a photograph of a woman smiling and holding a young child. They are positioned under a large, colorful canopy with various geometric patterns in shades of orange, red, green, and blue. The entire image is overlaid with a semi-transparent blue filter. The text is located in the lower-left quadrant of the page.

CHAPTER 3

Uplifting our communities, safeguarding the environment

*"In every community, there is
work to be done. In every nation,
there are wounds to heal, in every heart,
there is the power to do it."*

Marianne Williamson (US author)





“Every person has got the capacity to put food on the table themselves.”

MMA TSHEPO KHUMBANE

Mma Tshepo Khumbane is a visionary whose influence in the lives of others has often meant the difference between life and starvation.

Born in 1937 in rural Limpopo, Mma Tshepo has spent her life fighting poverty and malnutrition. Her weapons are simple but powerful. Mma Tshepo uses water to transform the lives of especially poor rural women.

In her early years as a social worker Ma Tshepo was often shocked with daily confrontations of malnutrition and chronic hunger. It was here that the seed was planted to formulate a long-term strategy to address the issue of food security. She started a women's movement, going from village to village, teaching people to plant, to be self-sufficient, to look for their own solutions to their problems.

Her smallholding outside Cullinan has become a teaching ground. Here she has constructed a fully functional rainwater harvesting system, and she now lives entirely from what she grows in her 100% organic garden. In winter alone, she produces almost a ton of vegetables, producing even more in summer.

She runs courses from her plot for rural women on different aspects of crop production and general business management. Ma Tshepo voluntarily uses her own food in catering for these groups.

She has made it clear time and time again that she does not believe in handouts. “I believe that every person has got the capacity to put food on the table themselves,” says Mma Tshepo. “While we give aid, let's have a sustainable strategy that will shift the current situation and will move us towards sustainable livelihoods through development.”

According to Mma Tshepo, communities need to be taught to take their future in their own hands, rather than to depend on government handouts. “You need to sit down and help people to think out their problems and get to a solution. These people are not disabled or old or sick. They have resources around them. You need to deal with their heads; with the syndrome of apathy. You need to take on the task of empowering the powerless to take control of their lives.”

Her Water for Food Movement not only teaches people to grow their own food, it also makes them aware of their own potential within their existing environment. They learn to take responsibility for their own survival with whatever means they have at their disposal. These methods included the harvesting of rain and runoff water, and the recycling of organic waste in order to grow crops on a small scale.

While her achievements and awards reflect her well deserving acclaim and applaud her achievements, it is the emotional responses that she elicits from those she has touched, that truly reveal who Mma Tshepo Khumbane is. Mma Tshepo mesmerises people and commands their attention. She crafts her message through poetry, physical touch, emotive speech, appropriate and original technical designs that she follows through with practical action. A character that enthral, she is volatile, emotional, energetic and irrepressible.

Over and above the lives she has touched, she has served on numerous national boards, including the National Water Advisory Council, the Agricultural Board, the South African Broadcasting Corporation (SABC), and Mvula Trust.

Mma Tshepo is the only woman to have been awarded a Lifetime Achievement Award by the Department of Water and Sanitation. In 2014, the Order of the Baobab was bestowed on her by President Jacob Zuma.

Extract from the poem, 'I breathe the spirit of passion', by Mma Tshepo Khumbane

*The love I have for what I do fills me up with hope for the future
The love I have for my hands fills me with commitment to achieve more*

*The love I have for my brain, fills me up with creative thinking
The love I have for my environment cheers me up when I see green*

*The love I have for my garden gives me a cradle for relaxation
when I feel tired and disempowered*

I love my garden

I love my rainwater harvesting strategies

I love my designs

I love the food I harvest from my own sweat

The Water for Food Movement

Eva Masha, Emily Masha and Lucy Masha are living proof that one does not need a formal education to make a real difference in the lives of people.

Finalists in the Women in Water Awards in 2004, these ladies, who hail from Strydkraal, in the Sekhukhune District in Limpopo, are literally burying the hunger through their innovative food production efforts. They are part of the Water for Food Movement, a grassroots organisation of rural women who are fighting starvation and poverty through the productive use of water.

Members of this movement commit themselves to the long walk in reaching out to people and educating them to fend for themselves and not to completely rely on handouts from the government. The secret lies in the integration of innovative new thinking and traditional wisdom.

At least 12,5 million people in South Africa live in rural households. These are people with limited income and food costs are a major concern to many. Malnutrition, especially among children, is common. However, gardening and farming play a limited role in village survival strategies at present.

People believe that there is no water, but the rain is there for the harvesting by gathering, leading and distributing runoff in small



Members of the Water for Food Movement with their mentor, Mma Tshepo Khumbane (second from left).



Evan Masha smiles after another successful crop.

earth channels. Water can also be stored for dry spells and winter in 'do-it-yourself' below ground reservoirs. Five hundred millimetres of rain falling on a roof or other impermeable area represents half a cubic metre of water available for storage per square metre of roof. Thus an area of 50 square metres can provide 25 cubic metres of water that is sufficient to see a 100 square metre intensive garden through a full winter.

Deep fertile soils can be created in the barrenness by trenching, if necessary, and mixing in household and organic wastes. Manually-operated hand or treadle pumps provide a 'hose for all', making watering a manageable chore.

The Mashas learnt these techniques from Water for Food Movement architect Ma Tshepo Khumbane (featured elsewhere in the publication) and then taught it to their neighbours. By harvesting rainwater and storing it for use during dry months they are now reaping the awards of their hard work.



ELIZABETH MOROASWI

The greatest results are often achieved by those who do not wait for assistance and support, but stand up to act by themselves. Women in South Africa have a lot to learn from iconic figures such as Elizabeth Moroaswi from Stykraal B Village in Feta Kgomo Municipality, Limpopo.

Elizabeth won an award worth R100 000 in 2010 for her outstanding work in community development. The award was granted by the DWS.

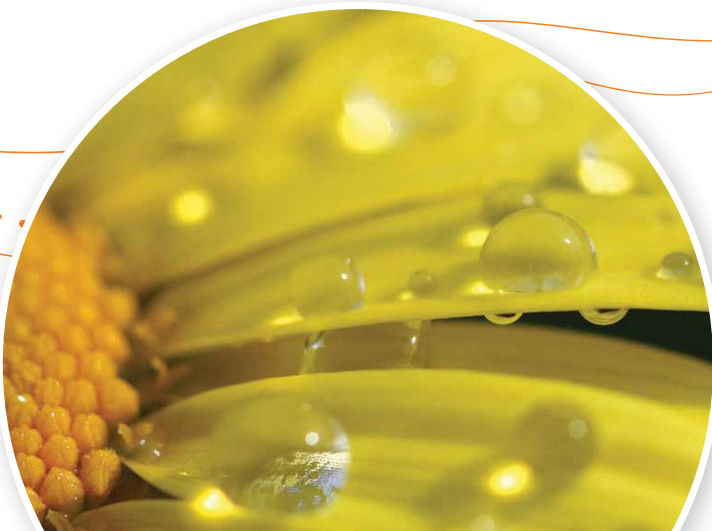
While water is a limiting factor for small-scale agriculture and other productive enterprises, dedicated food security activists such as Elizabeth have not stopped applying 'tricks' to conserve water and use it wisely for food production.

Her work started with the establishment of the Ikageng Masha Cooperative, which has contributed towards the improvement of the quality of life in her village and supports many other cooperatives. Her project produces vegetables using the most economic method of conserving water – the drip irrigation system. "Every day before we irrigate, we check the irrigation system for leaks; if they exist we fix them before starting to irrigate plants, so as to save water", she explains.

Since its establishment, the project has benefitted the locals extensively, through imparting skills to the youth and also by donating vegetables to schools and community events needing support.

For her cooperative to do this amazing work, they are relying on the supply of water to the village through canals from the Lepelle River. Support has been obtained from groups such as Namolelang Basadi Women's Group, who assist with the cleaning and maintenance of the canals. Lessons on how to save water have also been extended to the Pela Kwena Women's group.

Elizabeth adds that her cooperative has provided support to the Mashupjane Greening project, which won the 2011 Women in Water Award. The 2013 DWS award winners, the Ngwana Manthe Youth Group were also mentored by Elizabeth. Ngwana Manthe and Ikageng Masha Cooperative now supply the Lebowakgomo Spar with vegetables, which has saved locals the long trip to Polokwane to purchase fresh produce.





LYDIA KOMPE-NGWENYA

Lydia Kompe-Ngwenya or Mam Lydia as she is fondly known, was one of the first recipients of the Women in Water Awards in 2002 for her lifelong dedication to advancing the rights of rural women.

Born in Matlala in rural Limpopo in 1935, Mam Lydia experienced first-hand the brunt of apartheid's land dispossession policies. She was one of seven children. Her family was part of the congregation of a mission farm where her father was a deacon. At the age of 15 her family lost their land resulting in a decline in income and an inability to keep her in school.

“Although I am responsible for everyone, for all grievances of the community, I like to prioritise, and my priority lies with the empowerment of women.”

As a young girl she worked as a nurse aid and later in an electrical factory where she became a trade unionist. Here she found employers, fellow unionists and a state, each in their different ways relegating women to subordinate status.

In 1983, Mam Lydia joined the Transvaal Rural Action Committee, a non-governmental organisation set up to resist removals and to campaign for land rights. While working here she began to organise rural women. These efforts culminated in the formation of the Rural Women's Movement, an organisation of rural women challenging their exclusion from traditional decision-making structures, and campaigning for their right to water and other services.

During the period of the negotiations and the drafting of the country's Constitution, the Rural Women's Movement played a crucial role in ensuring that the powers of traditional leaders were subject to the gender equality clause as set out in the new South African Constitution.

From 1998 to 1992 Mam Lydia served on the Victims of Apartheid Advisory Committee. This committee located where activists were being held by the police, offered victims legal assistance and offered places of safety.

In 1994, Mam Lydia was elected to Parliament. She has served on various committees, including the Parliamentary Portfolio Committee of Water, Agriculture and Land. She has travelled extensively in southern Africa, particularly Botswana and Zimbabwe, to learn about and assist with rural development focused particularly on women and youth. Today, she is a member of the Limpopo Provincial Legislature. Helping to solve problems on the ground brought democracy alive for the people, and especially the women in her constituency. Early on, Mam Lydia lobbied for a dam and piped water under the Reconstruction and Development Programme. She helped to unblock the serious bottlenecks that cropped up along the way, both with national government and provincial authorities. Electricity and better roads followed.

She makes no apologies for focusing on women, explaining: “Although I am responsible for everyone, for all grievances of the community, I like to prioritise, and my priority lies with the empowerment of women. Rural women are the most disadvantaged people in our society. They are born and brought up in this system, in which women are regarded as inferior. It takes a long time, even if you explain the Constitution, for them to understand that they have rights.”

In 2009, Mam Lydia was awarded the Order of Luthuli in Bronze from the Presidency for her commitment to worker's rights, the empowerment of rural women and the liberation of South Africa's people.



“Every single human has dignity and that dignity is inherent. It is something that is our birth right.”

Extract of poem by
Pregs Govender

*Silent
I listen
And hear my voice
Freed of judgement
It speaks*

*Of possibilities
Wild
Untamed
Being*

*Whole
Undivided
Connected
To all of life*

*It speaks of love
From which courage grows.*

PREGS GOVENDER

Pregaluxmi (Pregs) Govender was aware of injustice from a very early age. Born in Cato Manor, in Durban, she had been involved in anti-apartheid activism from the tender age of 14, before joining the trade union movement in the 1980s. “There are many, many women who instinctively understand that the way in which girls and boys are pigeon-holed is wrong. The gender stereotypes constrain our freedom to be fully human.”

Pregs was National Educator of what later became the Southern African Clothing and Textile Workers’ Union (SACTWU) before heading South Africa’s first Workers College. Pregs served on the executive structure of Congress of South African Trade Union’s (COSATU’s) National Gender Committee and the United Democratic Front-affiliated National Organisation of Women.

During the negotiated transition, Pregs managed the Women’s National Coalition, which mobilised women to impact on South Africa’s Constitution. She then worked in the national RDP (Reconstruction and Development) office, integrating women’s concerns into the RDP. As an ANC member, she was elected to the National Assembly in South Africa’s first democratic election. Among others, she served as the Chairperson of the Parliament’s Committee on Women (1996-2002). This Committee ensured that 80% of its legitimate priorities were enacted by 1999. Pregs described her first impressions of Parliament to photographer and filmmaker, Adrian Steirn. “Parliament was very much a male institution. On the floor I was on there were no women’s toilets. There were two sets of toilets – both had a sign up saying ‘Men’. I remember just taking a piece of paper and writing ‘Women’ on it and sticking it over one of the signs.”

“The first founding value of South Africa’s Constitution is quite a revolutionary one. It is a belief that every single human has dignity and that dignity is inherent. It is something that is our birth right.”

Among others, she was the Chairperson of the Independent Panel Review of Parliament. Her human rights activism includes being a member of the global Panel on Human Dignity. Pregs’ awards include honorary doctorates in Law and Philosophy, the first Ruth First Fellowship and the Fulbright New Century Scholarship for the Global Empowerment of Women. She has authored many papers and articles, and contributed to several publications. Pregs is also the author of *Love and Courage - A Story of Insubordination*.

In 2008, Parliament voted unanimously for her appointment as Commissioner of the South African Human Rights Commission (SAHRC). In 2009 she was appointed Deputy Chairperson. Under her leadership, the SAHRC has been systematically addressing complaints about the right to water and sanitation, in many cases winning victories for previously voiceless and vulnerable communities.

“[Water and sanitation] are probably the most basic rights,” says Pregs. In the run-up to the last local government election, the SAHRC investigated and made findings firstly in Makhaza, and then against Moqhaka Municipality, in the Free State, that had both built toilets in open public

spaces without enclosing them. The Commission ruled that both municipalities had to urgently enclose these toilets in a manner that upheld dignity, privacy and clean environment.

In 2012, the SAHRC organised hearings in every province across South Africa. In packed halls members of communities from across each province presented the reality that they live with daily. Many spoke of poor quality water and sanitation services and often about the complete lack of basic services. Many participants spoke in despair and frustration about all the legal avenues they used to try to get redress. "The structural, systemic problem of inequality and poverty that is still defined by apartheid spatial geography calls for an urgent evaluation of policy and governance," notes Pregs. "This affects not just one right...many people who are poor are denied many fundamental human rights. This crisis can only be solved by true co-operative governance. The President, his Cabinet and all spheres of Government, beyond political party affiliation, must ensure that South Africa is governed in a way that upholds the rights of all."



ASHA RAMJATAN

Asha has skilfully applied her technical and scientific knowledge to assist communities to play an active role in integrated water resources management.

From humble beginnings growing up in Verulam, Asha, a mother of two, holds a Masters of Science Degree in Environment and Development. Her career started when she was employed as a laboratory technician at Umgeni Water in Pietermaritzburg. She then joined the water quality division as a scientific assistant. "While the laboratory formed a sound basis for my career, I found it quite restrictive after a while. I wanted to do more than just perform water analyses," she says. The scientific assistant position allowed me to interpret that data from a water quality management perspective."

She later expanded her services further to catchment management. At present, she works in the water and environmental services division of Umgeni Water.

Her catchment management activities came with the opportunity to work with several communities dealing with integrated water resources management problems. For example, the Sobantu community stream was being polluted regularly by illegal industrial discharges. On behalf of the community, water quality presentations were given to the Pietermaritzburg Chamber of Commerce and Industry, highlighting the extent of pollution impacts on the livelihood of this community.

Asha has also provided the secretarial function to the Msunduzi Catchment Management Forum at which water-related problems of the local communities are raised. This group of voluntary members then take up the identified problems with the appropriate local or provincial departments and lobby for solutions.

"It is crucial that we keep abreast with latest developments so as to ensure we interact with the right roleplayers and that the correct environmental management procedures are followed at all times."

To expand stakeholder participation within the Mvoti Msimkhulu Water Management Area, she conceptualised the formation of an association of non-governmental organisations, community-based organisations and faith-based organisations. This led to the establishment of the Msunduzi Environmental and Social Organisation. Members of this association have been involved in the stakeholder consultation process in the formation of the Mvoti Mzimkhulu Catchment Management Agency.

Together with the association, Asha has participated in raising the sanitation problems experienced by the low-cost housing community of Ambelton/Shenton area in Pietermaritzburg to the appropriate municipal officials.

An important part of her job is staying abreast with latest legislation and policies. "It is crucial that we keep abreast with latest developments so as to ensure we interact with the right roleplayers and that the correct environmental management procedures are followed at all times," Asha notes.

Asha says working with communities on catchment management issues has bequeathed her great joy. "It is one thing writing a report on water quality, but it is quite another coming together at a meeting with all the stakeholders and actually try and find a solution for the problem. This is quite a challenging task, but even moving forward one step is so rewarding."

According to Asha, in this job one is always trying to change one mindset or the other. "You cannot expect to be popular all the time, no matter how hard you try to establish good relationships with everyone in the catchment, and so your heart must be in it. It comes with many frustrations and stresses, but once you have achieved your goal, you forget how difficult it really was."



JO BARNES

Dr Jo Barnes will not be silenced. For nearly two decades this environmental epidemiologist and senior lecturer at the University of Stellenbosch has been battling bugs and bureaucracy to improve the health of those living in the dense settlements in and around the Boland.

Her early childhood was spent in the Sandveld (Piketberg) before her family relocated to Worcester. She started her life as a student studying mathematics. "At that time, there were basically only two major job choices for a woman with my qualifications: either in the Defence Force or teaching," she says. "Since I didn't want to teach at that stage and the Defence Force did not take in many women, I had no employment prospects. I went to work at the Department of Agriculture where I had my first acquaintance with irrigation water. After some years, I changed over to the Medical Research Council where I studied epidemiology."

At the time of writing, Jo was a senior lecturer in Disaster Management, Community Health, Epidemiology and Research Design at the University of Stellenbosch. She also occasionally lectures in the health aspects of Civil Engineering at the University of Cape Town, and she does a fair number of presentations on low-cost housing design, with the emphasis on sanitation.

Major research interests are water-related diseases, water pollution, housing and sanitation, especially in low-income areas. Through her extensive studies of these river environments

she has generated a uniquely valuable and useful set of data as well as alarming facts. She has shown that there are disquieting levels of disease-causing organisms in the rivers. Many of these organisms are resistant to commonly used antibiotics. People who get ill from these organisms are not easily treated – a grave risk to their health.

In addition, this water is not easily disinfected by the usual chlorine treatment employed by most municipalities since a significant number of the organisms show chlorine resistance – an important risk when using water to produce foodstuffs for the market, as well as a risk to the health of farm workers who have no other source of drinking water.

Her community-based efforts in Stellenbosch were designed to empower the community to help lessen the impact of sewage pollution on the nearby river. During these studies she designed two education campaigns for the dense settlement. She trained a team of community health educators to carry the messages from door to door.

She also designed and conducted two very large surveys to determine epidemiological characteristics of the population in the settlement, their knowledge levels, needs and attitudes towards sanitation. Jo ensures that aspects of her project are truly empowering, and the lessons learnt can be used to demonstrate how communities can be guided to improve their own areas.

She has met with considerable resistance from various authorities who either denied responsibility or felt that they were not equipped to deal with new demands on their time, skills and resources. It was not easy to obtain research funds and laboratory space to conduct her work.

Despite these hardships she persevered and completed her PhD in 2003 entitled: the Impact of Water Pollution from Formal and Informal Urban Developments along the Plankenbrug River on Water Quality and Health Risk.

Perhaps the most heartening aspect of her research has been the clear demonstration that the levels of faecal pollution in the Plankenbrug River at Stellenbosch could be reduced drastically by the simple, combined measures of community education and community-based upkeep of the ablution facilities that were already in place. Jo says: "This message of inspiration should be carried out to a much wider audience of local authority officials, to inspire them to tackle the problem of sewage pollution with much more energy and conviction."

Jo has received numerous awards for her efforts, including the Order of the Disa in 2007 for meritorious services to the Western Cape Province. She also won a Women in Water Award in 2007 in the category Education and Awareness. In 2005, she won the Cape Times/ Caltex Environmental Award for her research on the contamination of rivers.



PAMELA TISO

Pamela Tiso is one of the caretakers of the community ablution facilities at Duncan Village, Buffalo City Metropolitan Municipality.

She and other caretakers became involved in 2012 through a community initiative to have sanitation facilities in their area. They were part of the delegation that was elected by the community to speak to their Councillor to arrange for the building of toilets in their area.

Only the toilet/ablution facility was in place, the community gathered together to nominate people to take care of it, and Pamela was chosen, among others. According to her, more than a thousand people use their ablution facilities because they serve as public toilets. Even passers-by can relieve themselves. In addition, because the ablution facility that they are taking care of is the cleanest one, residents from other areas prefer to go there to relieve themselves, even though there are other ablution facilities closer to their homes.

In summer, Pamela and her team open the toilets at 05h00 to start cleaning and close them at 21h00. In winter, they open the toilets at 06h00 and close them at 20h00. Earlier this year, Pamela had the opportunity to share her story to hundreds of delegates at the 2015 Water and Sanitation Indaba, held in Durban. She received a standing ovation for her efforts to serve her community.

CANDICE SEHOMA AND THE BUILDING BLOCKS FOUNDATION



Candice Sehoma and the Building Blocks team

“Giving up the vision of restoring dignity to communities would be giving up on the one inherent attribute that makes us human. I strongly feel it should be protected.”

“Some people were reluctant at first, but joined when they saw visible results of our work,” she told *Alex News*. The local municipality has supported their effort by connecting the toilets to the sewerage system.

To date, 14 flushing toilets have been built around Alexandra. Once approved by the municipality, community members then have to contribute money to the toilet project (usually R100 per person) and Building Blocks Foundation then pays the balance of the money. All who contributed to the building then get their own key to the toilet. There is also a roster per toilet block. Users then pay a local resident to paint the toilets in bright colours.

Earlier this year Candice accepted the Lead SA Hero Award for Gauteng in the adult category on behalf of Building Blocks Foundation. Last year, Candice was also awarded a Community Hero Grand Prize in the Elizabeth Arden Make a Visible Difference Awards.

According to Candice, Building Blocks Foundation’s story is one of dignity. “Giving up the vision of restoring dignity to communities would be giving up on the one inherent attribute that makes us human. I strongly feel it should be protected.”

Psychology student, Candice Sehoma, runs the Building Blocks Foundation along with Lukhanyo Nakho, Pearl Ngoasheng and Itumeleng Mothopeng.

Aged between 23 and 24, the four got together to establish the Building Block Foundation, which aims to restore the dignity of residents through reducing the number of bucket/portable toilet systems in Alexandra and replacing them with flushing toilets.

Candice, who hails from Alexandra, grew up with the bucket toilet system, an experience she describes as ‘appalling’. At 19, she realised that her family could not wait for the government to supply improved sanitation services, so she went door to door in her community and invited her neighbours to a communal meeting where she proposed the idea of building a flushing toilet to replace the bucket toilets in their communal yard. Together, the community built two flushing toilets with steady brick walls.

Today, Building Blocks Foundation actively involves the residents of Alexandra in the building and maintenance of flushing toilets, and also runs community workshops for adults and children in the area to raise awareness on sanitation and environmental cleanliness.



HAMEDA DEEDAT

It was her passion for research, which then developed into a passion for advocacy, particularly around water rights, access and factors that prohibit or violate rights particularly of poor, historically disadvantaged that has shaped Hameda Deedat's career path.

Hameda hails from Cape Town and holds an Honours Degree in Industrial Sociology from the University of Cape Town. She started out as an assistant researcher in the education policy unit at the International Labour and Research Information Group (ILRIG). She later progressed to being a full-time researcher and educator.

"Women are instrumental in determining the future of our water resources and in providing insight and wisdom in how water and sanitation services and resources should be managed."

"My experience and training at ILRIG set the tone for my career," Hameda explains. "I was also trained under the GERA (Gender and Economic Rights in Africa) programme, which has an international trade focus. This expanded not only my research work but also my expertise in advocacy, and areas of work which became water trade and gender."

Hameda then worked for the Municipal Service Project as a researcher coordinator. In 2002, she became an active member of the South African water caucus, which is a loose network of civil society organisations and individuals. This offered her an amazing platform to engage Government officials from various departments on water and sanitation issues, with positive impacts for the communities and civil society organisations working towards the improvement of the lives of ordinary South Africans.

After a few years of working on her own, Hameda re-entered formal employment through a DWS-funded project on community service organisation (CSO) participation in the water sector. Here she was appointed for three years as the CSO coordinator for the civil society Masibambane programme.

Hameda has also participated in various research projects for the WRC, including a project on the acceptability of reclaimed water within the Islamic faith and a study looking at the social acceptability of smart meters. At present, she is working on a capacity building project funded by the Green Fund Climate Change project. As a senior researcher she is running capacity building workshops for trade union representatives from the various trade union federations on climate change.

Hameda lists several career achievements. "I was the researcher who contacted the human rights lawyers to investigate the incorrect implementation of the Free Basic Water policy in Phiri, Soweto, and through my research and advocacy the case of the citizens of Phiri went to court (legally known as the Mazibuko case). In this instance I gave a voice to the voiceless and showed how advocacy and research can make a difference in the lives of people." As a result of the court ruling, the City of Cape Town opted not to install prepaid meters.

In addition, Hameda's research on Free Basic Water as well as her advocacy has ensured that the plight of many people subjected to water restrictors, prepaid water meters and, in some instances, demand management devices, have been brought to the attention of decision-makers. At times, municipal officials have been forced to change policies and practices to the betterment of the poor communities whom she serves.

As CSO coordinator for the Masimbambane programme she also ensured that not only was the monies used directly for the benefit of communities, but each cent spent was accounted for. In addition, Hameda ensured that more than just lip service was given to the involvement of CSOs in the process. "We could truly show the role and value of CSOs – that is true cooperative governance."

Her honesty, transparency, accountability and belief in ethics have laid challenges before her door, says Hameda. "I have lost both employment and 'friends' in the process. My belief in God, the support of my family and real close friends have helped me endure these challenges."

Women are instrumental in determining the future of our water resources and in providing insight and wisdom in how water and sanitation services and resources should be managed. Hameda is adamant that water should be seen as more than just something that comes out of a tap. "Women need to examine the current challenges presented by climate change, particularly around water, such as water scarcity, drought, floods, poor water quality, inadequate sanitation services and so forth, and turn these into opportunities. Women in various capacities, such as engineers, can develop socio-technical solutions to address water and/or sanitation challenges."

Women should push to become politicians at all levels and leverage that power to create the political will that can translate into laws and policies to enforce the protection of water resources and services, she adds. "In short, women can and must become implementers of change."

Imagine if all mothers took a universal position to teach their children the value of water – what groundbreaking impact that will have. To young women she says: "Don't underestimate your power and ability as a woman to make a difference. Become the change you want to see."



CHAPTER 4

Young water professionals

"I look at a stream and I see myself, a native South African, flowing irresistibly over hard obstacles until they become smooth and, one day, disappear – flowing from an origin that has been forgotten toward an end that will never be."

Miriam Makeba





LUNGI ZUMA

Ethekewini Municipality Senior Chemical Engineer, Lungi Zuma, made such an impression on the Minister of Water and Sanitation, Nomvula Mokonyane, earlier this year that she was invited to Parliament as a special guest to listen to the minister's budget speech.

Lungi grew up in Esikhawini, in Kwazulu-Natal. She attended Eshowe High School after which she was accepted to the University of Cape Town for a BSc Chemical Engineering Degree. She is currently writing up her dissertation for her MSc Chemical Engineering Degree.

Engineering was a natural choice for Lungi, science had always been her favourite subject. "I was always interested in how things work. After finishing my Engineering Degree, I knew that I wanted to use my engineering skills to create a positive different to the world; hence my first job was in environmental engineering. However, after some time I realised that I wanted to do work that had a direct impact on the lives of the poor. Hence, I decided to change my career path to water and sanitation."

In short, Lungi wants to use her engineering skills to directly make an impact on the communities of South Africa. "I love that I can use my technical engineering and management skills to solve some of the world's problems, to make people's lives better and to protect the environment."

She manages the Newlands-Mashu Research site that is investigating integrated research with decentralised wastewater treatment. She works with a team comprising Professors, lecturers, post-doctoral scholars and post-graduate students that conduct the research on-site.

"I am the first point of contact within the unit with relation to research conducted by universities and universities of technology with respect to nutrient recovery from sanitation products, wastewater treatment, greywater treatment and reuse," Lungi explains. "I also manage the international researchers on research activities conducted in Durban – including management of resources and coordination of activities."

It was a visit to her test site that prompted the Water and Sanitation minister to invite Lungi to Parliament. Here the minister saw first-hand the potential sanitation solutions that research can offer.

"Working in the sanitation sector is not the most glamorous job at times, but it's worth it!"



A urine diversion toilet in Durban.

Lungi conducted her Masters research on the topic of characterising the pit latrine contents from different types of on-site sanitation systems, through the Pollution Research Group at the University of KwaZulu-Natal. She says identifying these characteristics will be helpful for engineers to design treatment processes for sludge and new toilet systems as well as having the potential for the end use of the sludge in agriculture or as a fuel.

Head of the PRG, Prof Chris Buckley, has been an inspiration for her. "He ignited my love for sanitation and water-related work. His enthusiasm and work ethic has inspired me as a young person in this sector."

According to Lungi, the greatest challenges of her job and as a researcher is managing the sometimes unrealistic expectations of communities around basic services. "People are always asking if the work we are doing will lead to them getting flushing toilets. I don't think it is something I have overcome as yet, however, I feel that with the work that is being done at all levels of government the message will get through eventually that waterborne sanitation is not appropriate in all circumstances. What I do in those instances is to explain the cost implications [of waterborne sanitation], the impact on water resources that current flushing toilets have and that they are not the ideal solutions for the future; that we rather need to look at alternative sanitation technologies."

While she is still relatively new to the sector, Lungi has strong views on the role of women in the water and sanitation sector. "Women should lead by example, especially in the community setting. Educating women about aspects such as water conservation, greywater re-use in gardens, not polluting water courses ensures that this information will be passed on to the household and to the overall community. This ensures that women are at the forefront of the movement"

She has the following advice for young people wanting to enter the sector: "Get a solid educational background; don't be afraid to make bold career moves; and be ensured that working in the sanitation sector is not the most glamorous job at times, but it's worth it!"



INGA JACOBS-MATA

Dr Inga Jacobs-Mata is living proof that your age – or lack of it – should not stand in the way of your ambitions.

Inga is a political scientist by training with a focus on regional and international water governance in Africa, looking at cooperative governance in shared river basins in the southern African and East African regions.

She grew up on the Cape Flats, the youngest daughter of her librarian father and stay-at-home mother. Inga holds a Master's Degree in political science from the University of Stellenbosch, a Bachelor's degree in international relations from Grinnell College, Iowa in the US, and a PhD from St Andrews in Scotland. During her time in Scotland she held down three jobs to subsidise her studies.

"I was fortunate to have received scholarships to study in different corners of the globe, so I was able to travel and see new places from a very young age," notes Inga. "This gave me the opportunity to experience different types of education systems in various countries, while meeting people from different backgrounds, which expanded my world view in so many ways."

Having completed her doctoral studies overseas, Inga returned to South Africa to contribute to the development of the country and its people, specifically specialising in transboundary water governance in Southern Africa. She first started working at CSIR and later joined the WRC as a Research Manager.

It was only once she started working that she realised how useful and applicable a political science degree can be for the water sector. "The complexity of water challenges today necessitates a holistic and integrated approach, and requires inputs from a diverse range of disciplines and expertise. I have found a home as a social scientist in the water sector."

While a highly published and recognised scientist at a young age, she has also dedicated time to the development of other young scientists and has played a significant leadership role at both national and international levels. She was the president of the Young Water Professionals (YWP) network in South Africa between 2012 and 2014, serving more than 1200 members, and served as the Global President of the organisation between 2010 and 2012. She also sat on the International Water Association (IWA) Board of Directors and the Water Institute for South Africa (WISA) Board of Directors.

In addition, Inga co-founded the Forum for Young Scholars in Transboundary Water Governance, a WRC-funded collaborative and transdisciplinary exchange initiative for scholars interested in this field. The forum encourages the recognition and mutual respect of multiple perspectives.



Surrounded by powerful women. Dr Inga Jacobs-Mata (centre), with colleague Eiman Karar (left) and Dr Nozi Mjoli (right), both featured elsewhere in this publication.

Inga is the youngest ever person to be appointed in an Executive Management role in the history of the WRC. Her portfolio is Business Development, Marketing and Communication, and she provides strategic monitoring support for research trends in the water sector, while leading efforts, nationally and internationally, on the understanding of the water knowledge cycle in South Africa.

Inga declares that her line of work is still male-dominated, but with her trademark grin, she declares that “this is changing”. She has always enjoyed a challenge and says that her Cape Flats childhood taught her how to overcome obstacles with the “desire to be better than I was yesterday.”

She has a string of awards to her name, including being named one of *Mail & Guardian's* Top 200 Young South Africans (in 2011), and a Young Scientist Water Research Award (won in 2012). In 2013 she was named GreenMatter Senior Fellow for her commitment to the development of other young professionals, particularly those in the water sector, and her personal contribution as young leader.

In 2014, she topped it all with an international Young Water Professional Award from the IWA, the highest award a person under the age of 35 can receive in the organisation. She is now the honourable IWA Young Water Professional Ambassador (2014-2016).

“I have two simple life mottos,” Inga declares, “Yes I can. And commit to the road. From my own personal experience, there are many opportunities for young people in this sector. It is about taking these opportunities and knowing how to use them to your advantage.”





“Supervisors should not be afraid to give us more scope to find ourselves.”

TERCIA STRYDOM

Tercia Strydom was thrown right from the deep blue sea into the deep end when she started her career at SANParks, having to move out of her parental house in Cape Town “to the middle of nowhere” when she was accepted in the SANParks Junior Scientist Programme.

This is an initiative to train, empower and mentor young scientists from previously disadvantaged groups. It allows students the opportunity to work with SANParks Scientific Services and gain practical experience while studying full-time.

She completed her undergrad studies at the University of the Western Cape in Environmental and Water Science. This was followed by her Masters in Hydrology through the University of KwaZulu-Natal’s Centre for Water Resources Research, relocating to the Kruger National Park for the project. “It took me three months to realise that I don’t want to go back to the big city,” she says. Funded by the WRC, Tercia has now completed her masters on pyrohydrology in African savannas, the first on the topic.

Yet, the achievements do not stop there. She was recently invited by the WRC to speak at the launch of the prestigious book, *Celebrating Twenty Years of Excellence in Water and Sanitation Research in South Africa*, which reflects on and conceptualises the last 20 years of research within the water and sanitation domain.

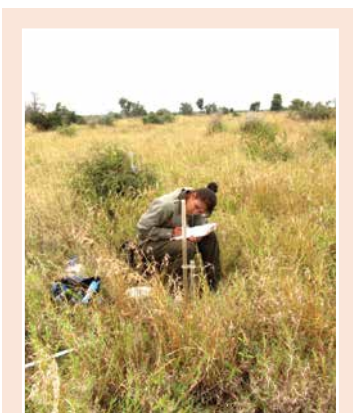
She relishes in the “incredible” freedom that she was given by her supervisor, Dr Eddie Riddell and SANParks coordinator, Navashni Govender. “Initially I was overwhelmed, but I learned that I was capable of things that I didn’t think I could do.” She says that she has learnt that it is important to give students enough freedom while you are nurturing them, as they are likely to take on more challenges that way. “Supervisors should not be afraid to give us more scope to find ourselves,” she says.

She also lists her time in the Kruger National Park as a high point. The amount of time you spend doing your research is much greater than if you are at a university, and you are surrounded by scientists that have done it all before,” she says.

She is, however, not done with Kruger yet. Tercia has located to the park’s Phalaborwa office for her PhD, again with the support of WRC funding. Her work will entail monitoring where water gets ‘lost’ in the Letaba River from where it is released from the Tzaneen Dam until it reaches the Kruger National Park.

The river’s flow is measured in Kruger, and when it gets too low to meet the Reserve, operators in Tzaneen release more water from the dam. The amount of water that needs to be released is worked out according to the SPATSIM model, yet, when it reaches the park, it is not enough. Transmission loss is estimated to be as much as 30%.

“So, where is it going?” asks Tercia. They will be investigating if it is natural loss, to the riparian vegetation and groundwater for example, or due to extraction by small-scale farmers next to the river. “Once we know how much water naturally gets lost, the dam operators can compensate,” she says.



Tercia in the field



(Photo credit: CSIR)

"We need women to be involved in the important technical conversations that affect water and sanitation management ... we cannot afford for half of our population to remain outside of the conversation."

EUNICE UMBOMBA-JASWA

Eunice consciously steered her career path toward water and sanitation in order to combine her interest in both environmental issues and microbiology.

She was born in Ghana and moved to South Africa with her family in 1997. Eunice holds a PhD in Microbiology from the Royal College of Surgeons in Ireland (RCSI), National University of Ireland, an MSc in Medical Microbiology from the London School of Hygiene and Tropical Medicine (LSHTM) University of London and a BSc in Medical Laboratory Science from the University of Alberta in Canada.

"Microorganisms can be helpful to the environment but can also be harmful, especially to humans. In Africa, many health issues can be solved by tackling environmental issues. Access to clean water and preventing disease often starts with making sure our environments are managed properly to reduce the occurrence of disease. While I was still an undergraduate student, I started to see that water was rising to the fore not only as a research area but also as a critical development issue," she says.

Eunice started out as a Medical laboratory technologist in 2002 while she was still completing her first degree in Canada. When she returned to South Africa after her Masters degree, she joined the Department of Microbiology and Plant Pathologist at the University of Pretoria as a Research Assistant.

She then moved to the CSIR as a microbiologist, leaving for three years to complete her PhD in Microbiology, which focused on looking at solar enhancement technologies that can use sunlight to treat water contaminated by bacteria that cause waterborne disease. Eunice finally returned to the CSIR following her PhD in 2009, and has since then been working as a senior microbiologist in the Integrated Water Assessments research group.

Eunice researches various ways in which water can become contaminated. "I identify the microorganisms within the water and look at different and effective disinfection methods that could potentially make water safe to drink, with a special focus on household level," she explains. "My current research projects involve looking at the pathways that contribute to the presence of microbial pathogens in the ecosystem and how these microorganisms can then move into water for human use which can ultimately have a negative effect on human health. The results of this research will provide the basis for management guidelines aimed at ensuring the sustainable use of aquatic ecosystems."

Eunice does not have a particular role model, but is rather inspired by people who have stayed in the field for a long period of time – "people who see problems as solvable challenges, and have committed themselves to come up with novel solutions."

On the continent, she finds it particularly inspiring to see researchers and scientists who do not just seeking to replicate the solutions of other countries, but are rather striving for home-grown solutions that fit their social and economic contexts.

"I also admire people who are consistently learning, even when they seem to have reached the pinnacle of their careers and are continually open to new ideas. There are also some NGOs within the sector that are striking a good balance between working on large infrastructure projects and mobilising and educating communities around water use and health/environmental issues."

Despite all her own academic achievements, she is most proud of the students she has supervised to date. “Two graduated last year with a BTech and MSc respectively; and my first PhD student will graduate in September, the second PhD student is currently finalising their thesis and will be graduating early next year. All of them were looking at different facets of the effects of microorganisms on our water resources. It has been extremely rewarding to guide them through their research but also to know that in a small way, I am contributing to the growth of African professionals within the sector.”

Being such a sought-after researcher means that time management is always a great challenge, as Eunice is sometimes left in a position where she is involved in different research projects and teams at the same time, which all require field and laboratory time. This is in addition to her administration-related duties.

She explains how she deals with this challenge: “Having taken time to gain an understanding of how my concentration, productivity and enthusiasm peaks and wains during the day has helped me utilise my time at work more efficiently. I am in the fortunate position where for the most part I get to schedule how my work day will run. This allows me to either dedicate a couple of days to one particular task or work on several tasks during the day. Having a deadline to work towards too and getting to tick off items on my to-do list serve as motivators to manage my time effectively.”

According to Eunice, women need to become far more involved in water and sanitation from policy drafting and implementation all the way down to community leadership; but especially in science and engineering where there is unequal participation between men and women.

“As a continent, we need women to be involved in the important technical conversations that affect water and sanitation management – these are universal issues integral to our daily lives and the economic development of our continent so we cannot afford for half of our population to remain outside of the conversation.”

Eunice strongly encourages more young women to join the sector. “We need you! That being said, you need to also be prepared to work hard! If you intend to join the sector, make sure you read widely, be extremely observant and always welcome opportunities to learn (all manner of skills) – as scientists and researchers we have to be aware of the contexts in which we operate. Our work extends far beyond the laboratory and deeply affects the lives of communities, often times areas that are extremely vulnerable to environmental disturbances. Scientific research is time consuming and often involves large teams so you also need to have patience and a collaborative spirit to succeed.”





(Photo credit: Reel Gardening)

"The concept is so simple that planting and maintenance can be explained through one demonstration, thereby overcoming any language or education barriers."

CLAIRE REID

What started off as a part-time project by Claire Reid is not only ensuring sustainable nourishment for the poor, but has gained global recognition.

In 2002, at the age of 16, Claire found herself sitting in her vegetable garden with a tape measure between her knees and centimetre marks drawn on her fingers. Claire knew she wanted to grow vegetables to sell to her parents for extra pocket money. However, she soon became frustrated by the wastage of seed and fertiliser and her inability to get the seed to stay in the soil at the correct depth and distance apart.

She asked the family's domestic worker, Meggi, to help her with this overwhelming task by holding the seed packet and passing her the seeds while explaining the instructions on the back of the packaging. Meggi was unable to instruct Claire on how to plant the seed as the instructions were only in English and contained mathematical language that Meggi was not able to understand.

It was at this point that Claire decided she needed to create a way to both plant and keep the seeds and nutrients in the soil at the correct depth and distance apart, a form of planting that needed no mathematical or English education to understand, a form of planting that was simple, effective and easy to do in a short period of time. And Reel Gardening was the solution. The concept is so simple that planting and maintenance can be explained through one demonstration, thereby overcoming any language or education barriers. Using flour and fertiliser paste, seeds are stuck on to newspaper strips at measured intervals, and left to dry. This 'seed tape' is then wound into reels.

The strips are planted in furrows, with one edge of the newspaper left visible just above the soil. Seeds can then be watered by pouring small amounts of water along the newspaper strip using, for example, a two-litre cooldrink bottle.

The newspaper absorbs the water, reducing water leakage into the soil, and concentrating moisture around the seed. By keeping the seeds damp for longer, and by providing some protection from the cold, the newspaper helps the seeds to germinate faster than in traditional planting methods. In addition, the bacteria from the decomposing flour paste releases nitrogen into the soil, thus boosting growth. Over average, this reel gardening system is said to produce more plants from the same number of seeds, using about 80% less water than conventional methods.

This innovative, practical and easily applicable technique for planting and successfully germinating seeds in water-scarce areas earned Claire the 2003 Junior Water Prize from the Stockholm International Water Institute. She also won a Women in Water Award for research by women under 35 in 2003. A United Nations Environmental SEED award followed. In addition, she was a finalist in the Shoprite Checkers SABC 2 Woman of the Year Award in 2004.

Reel Gardening was able to secure a loan from Anglo Zimele in 2009 to enable Claire to develop the idea into a commercially viable and manufacturable product. Reel Gardening opened its doors for business in 2010 and soon began expanding and grew to a team of six. Claire chose to develop a handmade manufacturing process as it aligns with her dream of maximum job creation through the production of a product that will enable people to feed themselves. Reel Gardening initially entered the retail sphere with a range of 27 products – the

custom branded and corporate products followed. Claire continued to find a way to get Reel Gardening into the rural areas for which it was designed through the invention of the 'Garden in a Box', for which Reel Gardening won the inaugural South African Breweries Foundation Social Innovation Awards in 2011.

Garden in a Box is now making a difference in the lives of thousands of school children and community members across peri-urban and rural South Africa with the help of the newly established non-profit organisation called Reel Life.



ANDISWA MLISA

Andiswa Mlisa has been steadily climbing the corporate ladder since completing her BSc (Hons) degree with distinction at the University of Fort Hare (specialising in Geographic Information Systems or GIS and Remote Sensing).

Her MSc research findings were published as a book by a leading German publishing house, VDM Publishers. It focuses on studies of the Table Mountain Group aquifer, which could potentially yield high volumes of good quality water for the City of Cape Town. Andiswa explained a spatial decision support system to be used by a hydrogeology project team to research the water source.

Andiswa joined Umvoto Africa as an intern from Fort Hare University in 2000, and was employed as a GIS and remote sensing technician after she obtained her Honours degree. She rose to managing the GIS department of Umvoto, and in 2004 became a Director at the company. In 2006, she became a company shareholder.

She has been involved in various research projects throughout her career. Among others, she developed, managed and applied pioneering systems using Global Navigational Satellite Systems (GNSS) with her team, in order to monitor and manage groundwater as a possible supplementary water supply in the Overstrand Municipality in the Western Cape. She was also involved in a project to develop groundwater resources for the Oudtshoorn Municipality.

Andiswa now works as a Scientific and Technical Officer for the Group on Earth Observations (GEO) in Switzerland, proving that one's ambitions can be as wide as the world.

Among many achievements, she was appointed as a member of the South African Council for Space Affairs (SACSA). SACSA is a statutory body which advises Government on space affairs matters in the country, license all space launching activities and take care of South Africa's interests, responsibilities and obligations in compliance with international agreements.

In 2011, Andiswa was the winner of the small business sector Award in the Technology for Women in Business (TWIB) awards. TWIB is an initiative aimed at enhancing the ability of science and technology to women in business, particularly in small, medium and micro enterprises. It is a national programme run under the auspices of the Department of Trade and Industry.



(Photo credit: CSIR)

***"Educate a boy,
and you educate
an individual.
Educate a girl,
and you educate a
community."***



*Leanie de Klerk in the field with colleague,
Dr Paul Oberholster.*

LEANIE DE KLERK

CSIR researcher, Leanie de Klerk, has been interested in nature and how the different trophic levels function together within an ecosystem as long as she can remember.

"I have always watched programmes on National Geographic and enjoy reading *National Geographic* magazines. The biological functioning of ecosystems fascinates me tremendously," she says. Perhaps she was also inspired by English primatologist, Dr Jane Goodall, for whom she has great admiration.

Leanie grew up on the East Rand, Gauteng, and matriculated from Hoërskool Oosterlig, in Boksburg. After matric she studied at the University of Johannesburg where she graduated with an MSc in Aquatic Health. A significant achievement for this young researcher is the fact that she completed all her degrees with distinction (cum laude). She has further received a variety of awards from the university and also for projects she has been involved in.

After completing her Masters Degree, Leanie started working for the CSIR where she is still employed today within the Water Research Group. She is also currently enrolled at the North-West University for a PhD in Environmental Science. Leanie's research experience includes water quality, limnology, aquatic ecotoxicology and the identification of freshwater algae.

Like many young mothers, Leanie's biggest challenge is to balance work and personal life. "Being mother of a two-year-old boy and also being a researcher requires a lot of time. I have found the best way to overcome this challenge is proper time management."

When asked her view on the role of women in the water sector, Leanie quotes Adelaide Hoodless who said: "Educate a boy, and you educate an individual. Educate a girl, and you educate a community."

Women can (and do) provide valuable input in the water and sanitation sector, because they have certain capabilities and strengths. "In my opinion, [women] have the ability to communicate to members of a community in a way that enables them to understand the needs of these communities. Secondly, they are able to convey messages of the importance of protecting water and our aquatic ecosystems, not only to adults, but also to young children, who are the decision-makers and managers of tomorrow," says Leanie.

She has the following advice for young women wanting a career in water: "Always stay focused. There will be many bumps on your way, but don't get distracted by them. If you are passionate about what you do, you will be successful!"



SHANNA NIENABER

YWP President, Shanna Nienaber, is surrounded by people who inspire and mentor her in different facets of her life.

Shanna was born in Grahamstown, but grew up in Pretoria where she attended school and undertook her tertiary education. She has an undergraduate BA Degree majoring in politics, international relations and philosophy; an Honours Degree in International Relations and a Masters Degree in International Relations, specialising in transboundary water governance. In 2009, Shanna had the opportunity to take up a studentship post at the CSIR. This gave her the opportunity to study, work and undertake research within the Water Governance Unit of the institute.

Shanna describes this was the moment that catapulted her into the water sector and broader environmental space. "I found myself presented with a unique opportunity to learn to apply my skills as a political scientist to the water domain. This was a rapid learning curve in terms of learning about water and the environment, bringing together the languages of natural science, social science and engineering and learning to work in a transdisciplinary context."

According to Shanna, the experience at the CSIR helped her to realise the privilege of working in the water and broader environmental space. "In this sector I have the opportunity to work at the heart of issues that really matter to society, I have the opportunity to work with passionate people who are at the cutting edge of working on creating a more sustainable world, and I get to immerse myself in the complexities of a sector that is fundamentally linked to all social and economic processes."

In 2012, Shanna joined the Department of Science & Technology. She is currently the Deputy Director of Environmental Science. Here she works with her team to develop and implement strategic research, development and innovation (RDI) roadmaps to guide RDI investments, planning and policy for the water, waste and broader Green Economy space. "We are also putting in place the supporting institutional mechanisms to streamline innovation processes linked to these roadmaps," says Shanna.

Shanna says that her involvement with the YWP has enabled her to actively practise the skill of developing professional networks. It has also presented the opportunity to work with inspiring young people and dedicated professional organisations in the form of WISA and IWA. "Most importantly, YWP has created the space for me to implement projects that support the development of skills for young water professionals and create platforms for young people to share their ideas."

The most recent project has been the Imvelisi: Creating Enviropreneurs Programme. In partnership with GreenMatter, YWP has supported a group of aspiring enviropreneurs through their early idea business development process.

How does she feel about being a women in the water sector? "As women we need to work together with other women and men to understand how the organisations we work in can

"Women are at the direct interface of water service delivery problems and threats; this makes them powerful reporters of challenges and a powerful resource in terms of taking ownership of water-related challenges in driving change."



YWP President, Shanna Nienaber with WISA President, Dr Jo Burgess, featured elsewhere in the publication.

support our career development and different needs. This is bigger than having gender mainstreaming policies in organisations. It needs to become a lived culture and ongoing dialogue that needs to be insightfully spearheaded by women in partnership with men." At a more water specific level, it is often women who are at the direct interface of water service delivery problems and threats. According to Shanna, this makes women powerful reporters of challenges and a powerful resource in terms of taking ownership of water-related challenges in driving change. "This is a resource that we need to tap into as we work towards solving the challenges of the water and sanitation sector."



NORA HANKE

German-born Nora Hanke has lived all around the world, but has chosen South Africa as the home in which she chooses to live.

Nora has seen and lived in many countries, including Germany, Spain and Brazil. "Growing up all over the world was fantastic, mind opening and led me straight to the social sciences; it did, unfortunately not lead to the great linguistic talent my mother had hoped for," she says, tongue-in-cheek.

After spending most of her high school years in Berlin, Nora received a full scholarship to attend the United World College in Canada. "It is really here that many of my interests and passions became clear to me; principles of sustainability and equitable social development were the underlying pillars of the school's pedagogics."

Her Masters in Arts in Politics and International Relations was completed cum laude in Scotland at the University of Dundee. She got involved in a number of student societies, including the Student Representative Council, where she was awarded Councillor of the Year as environmental representative for pushing through the first Environmental Policy of the Student Union. "As far as I am aware this document is still in use today, and one of the first of its kind in Scotland. For my volunteerism I also received the Millennium Volunteer Award from the Scottish government," Nora notes.

"The YWP network has afforded me the chance to build a professional network and meet amazing people, gain the necessary soft skills, as well as very hard skills like searching for funding."

She then decided to undertake an MA which would open more doors through higher expertise in a region and field. This was when she decided to come to South Africa to undertake a joint Masters in International Studies between Stellenbosch University and the Peace Research Institute Oslo (PRIO). "Suddenly I found myself in a country I knew nothing about, on a continent I had visited once when I was 11 years old. In hindsight it seems crazy that in just five years South Africa is the only place I consider home, and I am incredibly grateful for having been afforded the chance to build a life here, and shape the new South Africa," says Nora.

This Masters thesis on water governance in East Africa offered Nora the opportunity to go to Tanzania for field research. This also granted her a first glimpse into some of the work that is available to young people in the sector. "Apart from the ideological underpinning and interesting projects, the YWP network has kept me in the sector," notes Nora. "The YWP network has afforded me the chance to build a professional network and meet amazing people, gain the necessary soft skills, as well as very hard skills like searching for funding."

Nora's first 'real job' in the water sector was for the African Union (AU) / New Partnership for Africa's Development (NEPAD) Southern African Network for Water Centres of Excellence (SANWATCE) hosted by Stellenbosch University. She helped to build an academic network in Southern Africa and beyond through a project funded by the European Commission. "At least I was familiar with the lingo through my translation jobs, but it was a challenge understanding the professional workplace, especially in such an international environment," she says.

Following the end of the European Commission funded project, Nora wanted to go back to research. Stellenbosch University Water Institute approached her to work as qualitative researcher on a project for the Energy and Water Sector Education and Training Authority (EWSETA) to conduct an educational needs analysis of technical and vocational education and training college lecturers.

Nora also continues with her volunteering activities, mainly in the YWP network. Nora is the Vice Chairperson of the national YWP chapter.

At present, Nora is EWSETA's Regional Coordinator in the Western Cape office. "My role is diverse and ranges from supporting workplaces in formulating their workplace skills plans and annual training plans to stakeholder meetings, researching and providing input into the sector skills plan, to name but a few," notes Nora.

She has had many mentors, but singles out Dr Inga Jacobs-Mata (featured elsewhere in this publication). "She is highly committed, works extremely hard yet seems to 'have a life', never left anyone behind, and has an innate ability to guide and suggest the best solution in a way that you also learn yourself on the way. She also introduced me to the water sector, suggested my thesis topic, and has been there consistently when I needed advice."

Nora's greatest achievement to date was leading the organisation of the 2013 YWP conference. "We were expecting 450 participants. Prior to this event I had never chaired a meeting, assigned actions, seen a budget spreadsheet of this magnitude or had any network worth mentioning. It was an extremely steep learning curve, I enjoyed it tremendously and could count on my committee as Chairperson to support and guide me."

Throughout her career the most inspirational and dedicated people she has met in the sector and in communities have been women. "Women obviously play a huge role in empowering communities, creating safe environments for themselves and their children. I myself grew up with my mom and grandma as primary caretakers, as well as three little sisters, and know what it means to grow up in a women-driven household; it means little money, unending energy, and an incredible informal network which supplements all aspects of life and a resulting social environment which money can never replace.

"Of course, in Germany we had running water and sanitation and other basic services which allowed my sisters and I to go to school and study. Every girl and women has to be afforded the same opportunity and once I understood how water is linked to this process, I committed myself to achieve this in my small way."



Delegates at the YWP conference in Stellenbosch in 2013.



