



YOUTH FOCUS

HIGHLIGHTS OF:
YOUTH IN WATER SCIENCE
AND ASPIRING SMALL AND
MEDIUM ENTERPRISES



WATER
RESEARCH
COMMISSION

DEAR READER

Youth has a key role to play in ensuring a secure water future for South Africa. This WIN-SA publication acknowledges the incredible work that the water sector is playing to motivate and encourage youth participation in sustaining water and sanitation delivery.

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OUR YOUTH RE-IMAGINING THE FUTURE OF WATER

Despite an overwhelmingly chilly day in Johannesburg, the South African youth came out in numbers to the former Women's Jail, Constitution Hill, to celebrate a youth month activity on Tuesday, 27 June, in honour of the 1976 youth. While the youth of '76 fought for the country's liberation from the tight and unfriendly youth policies, nowadays our youth face a unique challenge of unemployment, poverty and inequality, accompanied with economic decline, with water scarcity being at the centre of it all.

Amongst the series of dialogues hosted by the Water Research Commission (WRC), water conversations by youth have become inevitable. This year's youth dialogue was held in collaboration with a strategic partner, ICRD Group Foundation, with a side session – a Water Mini-Hackathon under the theme 'Re-imagining the future of Water'. ICRD Group Foundation is an organisation that assists social innovators and aspiring entrepreneurs to develop and mature their life-changing ideas.

The dialogue and Water Mini-Hackathon was premised on the fact that collective action plays a vital role in building a sustainable and water-secure future for all. By collaborating to mitigate risks and seize opportunities, as well as preserve and maintain this valuable shared resource, we can create a water-secure future for South Africa. These collective actions focus on what can be achieved in partnerships between civil society and the public and private sectors.

Water directly affects South Africa's socioeconomic development, but is becoming an increasingly scarce resource. Based on current usage trends, South Africa is expected to face a water deficit of 17% by 2030, and this shortage will only be worsened by climate change. Because water is a shared resource, we are all at risk; therefore, it is critical to understand our

impact on water and incorporate water management into our daily lives. A massive drive is required to improve performance in public sector water institutions and local government.

Companies reliant on water for their operations, those that supply water and sanitation-related products, and also entrepreneurs, are acknowledging that Government requires their urgent support in the form of partnerships and innovation.



Keynote speaker: Warren Hero, Microsoft

Key messages to our youth

Setting the scene, WRC CEO, Dhesigen Naidoo, gave an interesting perspective on water security and explained what it means for South African youth today. In his talk, he emphasised how the Southern African region has just experienced the worst dry period in 50 years. While elaborating on this issue he said, "Climate change scenarios have taught us that we have to examine the way we use water currently. We have to rethink the ways we use water. Currently we are using 235 litres of water per day per person, which can be reduced."

Furthermore, Naidoo encouraged the youth to be more innovative in their endeavours. "We need

a technology toolbox,” he said. “We should be smarter in the way we use water; we need to rapidly expand the water availability that we currently have. For example, wastewater can be utilised as our freshwater resource. Harvesting of water from the rain such that we don’t lose the very little water we get. We need to learn how we can reuse the resources we have, get a water-sensitive design view and expand the water footprint and put well-treated water back into the river system.”



Keynote speaker, Microsoft’s Chief Technology Officer Warren Hero, spoke at length about the importance of data in the 21st century: “As youth in the 4th industry revolution you have to think of data as a key development tool.”

Among the many speakers, Xera Vegter, a Grade 8 learner and science fair winner shared findings from her study that focused on a very unique scientific subject: ‘Microbeads and their impact on the environment in South Africa’. (See Xera’s story on page 17.)

Pontsho Moletsane, an entrepreneur from Yellow Beast Technologies, shared information on opportunities for young entrepreneurs in the water space. Pontsho highlighted how he managed to

progress as a young entrepreneur, starting with entering school competitions, and how he has been winning other challenges that have shaped his career to where it is today.

Lucky Litelu of the IRCD Foundation said, “The future of water in South Africa requires a fresh new thinking from the youth – the water pricing we currently encounter presents opportunities for youth to be entrepreneurial in their approach, for example, faecal sludge presents opportunities to be food secure as a country.” “A lot of new water ideas will help drive South Africa’s economic growth that is urgently required. The future of water belongs to all those that nurture their dreams. About 60% of water is utilised in agriculture; a lot can be done by our youth in developing sustainable agriculture solutions.”

WRC Research Manager Eunice Ubomba-Jaswa explained how pollutants degrade our water quality and how youth can develop their careers around water as it is a scarce resource. Eunice’s presentation captured the attention of the audience when she shared her interesting personal career growth path. While studying towards her doctorate, she developed a solar disinfection reactor that is now used to purify water in many parts of the world, such as Uganda, Cambodia, Kenya and India.



Eunice Ubomba-Jaswa, WRC Research Manager

Hosting a 'water hackathon'?

With South Africa having faced the worst drought recently, and the Western Cape Province still grappling with water supply, there is a need for new ideas from great thinkers who are ready to new water solutions. A water hackathon is one such innovative way that contributes to new ideas leading to saving more water. As part of this exciting WRC Youth workshop, a water hackathon was hosted as a side session.

Digital activist and hackathon mastermind, Tiyani Nghonyama defined a hackathon as a way of gathering like-minded people, ranging from programmers, scientists, and designers, to entrepreneurs, community leaders, cultural creatives, and thought and practice leaders, to solve social or business-related problems using technology. The participants in the hackathon work throughout the defined period towards reaching a specific goal. "Due to water being at the centre of all human operations, there is a need to bring innovators aboard and bring forward-thinking ideas and solutions in addressing the future of water," said Tiyani.

Drumming session keeping youth entertained



An interactive drumming session organized as part of the hackathon experience which broke the formal part

of the programme and got the participants to break into song and dance

The spoken word

The Freestyle poet and entertainer, Bongani Mathebula, captured the attention of delegates in his poetic water and sanitation narration. The audience was asked to throw in water-related concepts to form part of his informative edutainment story.

Music workshop with RJ Benjamin



RJ Benjamin and crew member

Who would have thought that water and sanitation discussions could lead to the composition of a song? RJ Benjamin, the famous Idols SA music coach, developed a song from the words randomly thrown to him from the audience. Not just entertaining, the activity taught the youth to be creative and spontaneous at the same time, especially in responding to water challenges.

YOUNG INNOVATORS TO REPRESENT SOUTH AFRICA IN STOCKHOLM



SAYWP Winners 2017 and the Department of Water and Sanitation officials in Stockholm

Three learners from Limpopo, who won the South African Youth Water Prize (SAYWP) competition, have done us proud in representing the country at the annual World Water Week held recently in Sweden, Stockholm.

The SAYWP is one of the projects that the department is implementing in its education programme called 2020 Vision for Water Education Programme.

The project is aimed at educating Grade 9-11 learners about efficient use of water and protection of water resources.

During this year's SAYWP competition held in Pretoria on 2 June 2017, the 16-year-old learners, Mokgotho Temogelo Thami, Mmola Desmond Kutullo and Nkwane Wayne Luka, who are in Grade 11 at Lebeko Senior Secondary School in Phalaborwa, developed a water conservation device that will help schools and communities to save water.

The device uses two aspects, a sensor and a timer. The sensor senses a hand/s to turn the system on to discharge water, and subsequently, the timer is set to discharge water for a certain period/volume.

In addition, to the system, a soak-away material is added to the system to absorb leaking water from the tap. The system also recharges groundwater and refills the water table/tank underneath.

Most of the materials used to build this system were donated by the locals, while other items were collected from rubbish bins.

The South African Youth Water Prize (SAYWP) is a science and technology collaboration between the Department of Water and Sanitation and the Stockholm Water Foundation in Sweden. The competition's objectives are to promote the protection of the country's natural resources and increase awareness amongst young people.

Although the project did not win the Stockholm Junior Water Prize, it has made the country proud looking at the way it promotes the saving of water.

The SAYWP programme also exposes and advances the interest of youth in science and technology, and motivates learners to pursue water and sanitation careers. The competition targets Gr. 9-11 learners who identify problems related to water in their school and community, conduct a research and come up with innovations recommended to solve these problems. SAYWP responds to the scarce skills challenge and it also serves as an incubator for the DWS Learning Academy.

The Department has a responsibility to follow through the learners who won the competition and also establishes partnerships with stakeholders for piloting their innovations. All regional finalists get Laptop Computer and the National top three get a

full sponsorship to follow a career in the water sector related field and cash prizes.

The provincial adjudication panels elect the provincial winners who become national finalists to represent South Africa at the Stockholm Junior Water Prize competition in Sweden. Since its participation at the Stockholm Junior Water Prize South Africa has won the competition first in 2003 and again in 2005.



The Director for Career Management, who leads the Learning Academy at the Department of Water and Sanitation, Ms Verena Meyer, said, "Opportunities exist for qualifying students to apply for engineering and water science-related studies. Amongst others, the Department provides in-service training, which is a one-year rotational structured training, and upon completion learners can join the Department under the graduate trainee programme."

The Department supports external bursars for full-time studies only. They provide a comprehensive bursary covering registration fees, class fees (no repeats), accommodation and meals, on-campus costs, books, and a small stipend. The bursary scheme also provides support to all levels of water and sanitation related studies, pre- to post-graduate. This support is offered for studies in the civil;

mechanical, electrical, and chemical engineering, water care, microbiology, biochemistry, chemistry, water resource management, hydrology, geology, geo-hydrology, and geographic information systems (GIS). A study bursary contract is signed with financial obligations and includes an agreement to the absorption into the Learning Academy.

Interestingly, all of the regional competition winners of all Department of Water and Sanitation youth competitions are allocated a bursary, provided they choose to stay within the career fields within science and engineering.

Department of Water and Sanitation Success stories

To date, the Department boasts achieving a huge success in the areas listed below:

- 309 registered graduates
- 50 Graduates registered as Professional Scientists
- 41 graduates registered as Certified Natural Scientists through SACNSP
- 63 graduates registered as Candidate Scientist through SACNSP
- 24 graduates registered as Candidate Surveyor /Surveyors through Geomatics Council
- 26 graduates registered as Engineering Technician through ECSA
- 87 graduates registered as Candidate Engineering Technician through ECSA
- 76 graduates registered as Candidate Engineer through ECSA
- 7 graduates registered as Professional Engineers through ECSA
- 1 Candidate works as a Project Manager
- 424 candidates appointed into permanent/ contract posts – reduce entry level vacancies from 24% to 6%

For more information visit
www.dws.gov.za/LearningA

SAICE AQUALIBRIUM - CHANGING LEARNERS' LIVES ONE WATER COMPETITION AT A TIME!

The South African Institution of Civil Engineering (SAICE) has just had their 14th annual Schools Water Competition. What started as a South African competition where learners had to design, build and operate a water distribution system, exactly the same way qualified civil engineers would do in a municipality, has over the past two years become international, with Swaziland and Zimbabwe also participating.



Picture : 1st Place Maritzburg Christian School

Very few interventions or career days have the advantage of practically illustrating what a career is all about. The finals of Aqualibrium, the SAICE Schools Water Competition 2017, took place at the Sci-Bono Discovery Centre in Newtown, Johannesburg, on Friday 28 July 2017. This is an adventure that everybody remembers once they have been there to experience the excitement first-hand!

The finals

The 2017 winner was Martitzburg Christian School from Pietermaritzburg, with team members Jason Mather, Malcolm Govender and Grace Ngeleka, with only 15 penalty points. Second place went to Parel Vallei High School in Somerset West, with team members Charl du Toit, Stefan le Roux and Juan Swanepoel with 25 penalty points. In third spot was

Kimberley Boys' High School with team members Guy Jansen, Tumisang Shuping and Thato Seipato, with 40 penalty points. In total the winners shared prize-money of more than R23 000.



Picture : 2nd Place Parel Vallei High School



Picture : 3rd Place Kimberley Boys' High

Regional winners came from as far as Bloemfontein, Dendron, Durban, East London, Harrismith, Kimberley, Port Elizabeth, Pietermaritzburg and Somerset West to combat the teams from Johannesburg and Pretoria, as well as the national winning team from Swaziland and Zimbabwe! Many of the teams were flown to Johannesburg and accommodated in a four-star hotel – an experience that these young people, and also some of the

educators, will never forget! For most, this was a first encounter with the 'big city'. Without the sponsorships of Rand Water, the Water Research Commission, Grundfos, Sci-Bono, Incedon and DPI Plastics, this would not have been possible.

This competition affords learners the opportunity of planning, designing, constructing and operating a water distribution network and they encounter all the same challenges that occur in real-life situations!

According to Memory Scheepers, SAICE Project Manager for Special Projects, the three members of the 2015 finalist team from Winnie Mandela Secondary School in Ivory Park, Midrand, are all currently studying civil engineering at the University of Pretoria!

Phomolong Secondary School in Tembisa, a really disadvantaged school where 80% of parents are jobless, has already delivered four civil engineers from the Universities of Cape Town and Wits! Currently the three winners from 2014 are studying civil engineering at the University of Stellenbosch – because of this competition!

Through this commitment, SAICE has proudly put a value to a competition that has led to so many learners, especially from rural areas and townships, studying civil engineering and which, at the same time, makes a difference to the priority scarce skills situation and the lives of many people!

The SAICE competition

Water distribution systems are important to supply safe and clean drinking water to people. The teams are tasked to design a model water distribution network to distribute three litres of water equally between three points on the grid using two different diameter pipes and connection pieces. They are then judged on how well they execute the task – working on a penalty points system. The teams have a period of about an hour in which to plan, design, build and operate their network.

This competition exposes learners to the practical application of processes that influence their daily lives, e.g., how water gets to their homes. They are made aware of the intricacies involved in the design of water distribution networks and the actual water delivery to households. The **grid** used for the water distribution network is on a background that depicts the entire water cycle with all the major impacts affecting this scarce resource. This grid intrigues learners, as well as educators, who find it a very useful educational tool.

The competition creates awareness regarding the issues surrounding water in South Africa. It spreads the message that water is a precious commodity, which should be **recycled, re-used** and respected, while the use of water should be **reduced**. Through this annual competition, SAICE takes the responsibility of spreading the news that water should be used wisely, that infrastructure should be maintained and that new infrastructure should be developed to provide potable water to all in South Africa.

In two consecutive years (2012/13 and 2013/14) the Aqualibrium initiative had the honour of being chosen as one of four finalists in the National Science and Technology Forum (NSTF) Awards, the oldest and most prestigious in South Africa, in the category where an individual or team is recognised for their outstanding contribution to science, engineering, technology and innovation (SETI) through science communication and through creating science awareness.

Aqualibrium strengthens Government's initiatives aimed at encouraging learners to take mathematics and science at school and to follow a career as a science or civil engineering practitioner. Only in this way can we assure that the quality of life of all South Africans will be better in future!

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YOUNG HYDROLOGIST TACKLES WATER RESOURCE MANAGEMENT AND PLANNING HEAD-ON, EASTERN CAPE

Meeting Nompilo Mahlobo, who was adjudicating the National Competition of the South African Youth Water Prize (SAYWP) at the Manhattan Hotel in Pretoria in June, was such an exciting moment for WIN-SA. We listened to her moving motivational talk directed to the competitors who were getting ready to showcase their projects to the panel of judges. We had a chat with her and our interest, of course, was to get to understand how she now found herself employed by the Department of Water and Sanitation (DWS) in the Eastern Cape Province. Interestingly, her journey started with the very same competition way back in 2006.



Nompilo in her office in East London, Eastern Cape

Nompilo's entry into the water sector dates back to 2005 when she, along with her fellow members of Mehlokazulu High School's environmental club in KwaZulu-Natal, decided to start an awareness project on river health. This project was entered into the SAYWP and came 2nd in the national leg of the competition. For her team, this was not enough. They then re-entered the competition in the following year (2006).

"We won the National SAYWP competition when we showcased an innovation involving the use of grey-water to make 'liquid compost'. This innovation saw

us competing in the Stockholm Junior Water Prize representing South Africa which was an absolute honour and privilege," elaborates Nompilo.

Developing a value added grey-water 'Plant Tea'

In 2006, Nompilo, together with her high school friends, Thabile and Thokozani Mbanjwa, developed an innovation which they called 'Plant Tea'. This is a liquid fertilizer which is composed of grey-water and a variety of organic household wastes, which not only saves water but also recycles plant nutrients.

The objective of their project was to help people in informal settlements to conserve precious water and to determine the effectiveness of Plant Tea as a fertilizer.

According to Nompilo, to test the quality of the mixture, they compared the effects on four agricultural plots using four different treatments involving plain grey-water and regular tap water. "The 'Plant Tea' proved to be more efficient and effective than both the plain grey-water and tap water."

Mentorship and career development

The Department has played a pivotal role in Nompilo's career growth in the water sector. She was funded by the Department to undertake studies in any field within the water sector and she chose to focus on hydrology.

Although she is enjoying her work, Nompilo is still studying further. "I am currently pursuing postgraduate studies and I am still being funded by the Department. Leaving university for the workplace, I entered into the graduate programme of the Department and had the opportunity to work with people who have expertise and know-how. Most importantly, I needed to grow my knowledge in the water sector and I am excited that I have gotten the opportunity to understand the entire value chain

of water and also the policies that govern the water sector at large," she says.



Facing water resources management head-on

Nompilo is currently working under a division responsible for water resources management and planning. Her work involves the authorisation of water uses which involves the use of hydrological models to determine the water balance for specific areas and to give an indication on where further development opportunities exist.

"I am also involved in the development of water conservation and demand management plans for irrigation schemes and water user associations. This involves developing water management plans and auditing of water use for these schemes to improve water use efficiencies," she adds. "We are currently in the planning phase of adopting of a historically Black-owned agricultural scheme. We are also undertaking to develop a catchment management strategy for our water management area of Mzimvubu-Tsitsikamma (WMA 7). This will look at the status quo of water use, water resources available for further development and determining the profile of the management area. This strategy will assist the department in identifying 'hotspot' areas in terms of

inefficient water use practices, identifying areas that can still be developed and indicate which areas have reached maximum capacity."

Opportunity to grow within the water sector

Nompilo's work has increased her awareness on how important water is for development. She has learned that without water, all sectors would come to a standstill. She also believes there is a lot of room for growth in her current job. She has discovered which aspects of the water sector interest her the most and plans on pursuing these.

"I would also love to move to delving more into water conservation and demand management and find means of improving water use efficiencies," she says.

Nompilo wants to start focusing on coming up with technological devices and implementing them in the agricultural sector, which is the largest user of water in the country right now. "I have seen that there is a gap in understanding the business of water, especially in rural areas. People do not seem to have the relevant information that will assist them in utilising water efficiently and creating economically viable businesses. I hope that I can assist in bridging that gap," she adds.

New ideas and water innovations

Nompilo believes that the water sector is wide open and is ready for new and interesting ideas. With the change in trends, innovations are required to accommodate new developments. For example, she stresses that new data and ideas are required to assist in improving current knowledge to make more informed decisions within the sector for planning and further management of water.

According to Nompilo, the youth must be involved

as early as possible to ensure the transfer of skills by the outgoing members of the water sector. "Furthermore, I think the school curriculum should cover environmental issues so that an interest is nursed from an early stage and the youth can come to understand the importance of safeguarding, managing and using natural resources more efficiently."

Re-visiting high school water project

When enquiring if Nompilo would still want to revisit her high school project she said, "I would gladly continue with the project. With the recent research being done on potential uses of grey-water, I would like to see how that information would help in improving our innovation." Nompilo stresses that she would particularly like to see her project being implemented amongst emerging farming practices,

especially to see it getting piloted in one of the schemes. She is currently gaining more data that can be used in its implementation on a larger scale.

"I believe we need to continuously find ways of reusing water to ensure that it covers a wider range of uses. And I believe that my innovation can be a means to do so," stresses Nompilo.

"My intention is to potentially partner with the Department of Water and Sanitation, perhaps provincial Departments of Agriculture and any other interested bodies to see this happen," she concludes.

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THE JOURNEY OF PONTSHO MALETSANE, DEVELOPER OF AN EFFICIENT IRRIGATION SYSTEM

When South Africa won the Stockholm Junior Water Prize in 2005 through the 'Nocturnal Hydro Minimiser' innovation, Matobele Motshidi, Sechaba Semaketse and Pontsho Maletsane's dreams of becoming renowned water technology innovators were realised. WIN-SA recently met with Pontsho, who gladly took his time to share his story and allow us to understand his journey since winning this big national and international competition as a learner from Shaba Semaketse Combined School in the Free State Province.

Pontsho and his colleague Motebele have been involved in water projects and competitions since they started high school. Their journey started with water audits. The first ever competition they attended was



Pontsho Maletsane, Yellow Beast (Pty) Ltd

with the Department of Water Affairs and Forestry (now the Department of Water and Sanitation) and they went to, among others, Xhariep Dam and Clarens for the learner competitions. Since then they have been pushing for recognition in the water space.

Developing the 'Nocturnal Hydro Minimiser'

A 'Nocturnal Hydro Minimiser' system is designed to use water efficiently for irrigation by activating the

water tap at night when evaporation levels are very low. It ensures that gardens are only watered when the soil has lost the necessary moisture needed by plants. This feature makes it more effective in saving water compared to some commercial models that provide water regardless of whether it is needed or not.

Pontsho says, "Our team entered the South African Youth Water Prize (SAYWP) competition with the hope of making it to another country outside of Africa. This was back in 2005. The idea was inspired by realising that at times after work, home owners in our area would prefer to irrigate their gardens at night. The evaporation levels are lower at night, so it makes water conservation sense."

"We made the realisation very early on that local challenges require local solutions. Even though this can be relative, it is likely the ones who go through the situation who can identify with what the target audience relates to as a challenge. That being said, because our idea was inspired by what we saw on a regular basis, it allowed us to ideate around that to come up with a solution," says Pontso.

"Another point was that sometimes when one goes to school, a neighbour's house would have a trail of water because the tap was not properly closed the night before. What we identified was that some users are not necessarily in touch with technology and that perhaps a solution was needed, and we came up with our idea for a water-saving device," he adds.

The 'Nocturnal Hydro Minimiser' is outfitted with four electrodes (metal bands) through which an electrical current is passed. The electrodes are inserted in the ground of the garden in order to detect the moisture levels that determine when the water tap is activated. The voltage difference is then measured between the electrodes. The greater the voltage

difference, the lower the electrical conductivity of the soil which is in contact with the probe.

Pontsho says, “The ‘Nocturnal Hydro Minimiser’ has great potential to improve the lives of many rural communities in South Africa”. Ponthso adds, “We strongly believe that the project has prospects for commercialisation especially considering that it is much cheaper than other commercial models currently in the markets.”

Bursary support after high school

Since winning the competition while they were at high school, Pontsho and Motebele have been working together as a team. They realised the need to form a company, which they called Yellow Beast Technologies.

‘Our team has two civil engineering practitioners, one with a B.Sc in Engineering, the other with a National Diploma. Our career choices were informed by our interest in the supply of water in large quantities. We managed to get bursaries from several organisations including the Department of Water and Sanitation and South African Institution of Civil Engineering (SAICE).

Besides studying, Pontsho and Motebele have each augmented their professional training with voluntary work in associations such as SAICE (Pontsho) and the South African National Commission on Large Dams or SANCOLD (Motebele). These organisations have given us leadership qualities based on different experiences of the same fraternity.

Moving the technology to the next level

In some cultures, crisis and opportunity mean the same thing. It is simply a matter of perspective. Elaborating on how the journey has been so far Pontsho says, “In terms of developing a product from an idea, the biggest challenge we faced as youth

from a historically (or currently, depending on one’s take) disadvantaged background is that ideas can hold a lot of valuable intellectual property, while at the same time requiring large amounts of initial capital investment, he confirmed”. “That being said, we struggled to get the most out the novelty of our idea once we published it. Albeit that this was a frustration, it was not necessarily a setback. It has been an opportunity to learn, because although back then we struggled to get the idea off the ground, in today’s world of open source, it is easy to get information publicly, and then use it to develop an idea to a proof-of-concept, which in reality is the first foot in the door to barcoding the idea.”

Irrigation technology gets recognition in South Africa



Apart from winning the SAYWP and Stockholm Junior Water Prize in 2005, there has been further recognition of this magnificent irrigation technology by the Innovation and Incubation Programme of the Central University of Technology (CUT) where Pontsho studied. The South African Breweries Kickstart Ignite event hosted in Braamfontein in 2016 saw Pontsho’s innovation getting first place, winning an amount of R400 000. SAB Ignite gave a chance to young entrepreneurs to showcase prototypes of their products.

“Apart from Boost, which some readers may be familiar with, En-novate selected us as among the top 15 agricultural entrepreneurs in South Africa to go to Israel in February 2017”, adds Pontsho. “Lastly, AWARD/GAIA selected us as one of the top 30 AgTech startups in Southern and Central Africa in April 2017.

Pontsho has had the chance to speak about their journey on Power FM and at the Entrepreneurial Development in Higher Education (EDHE) event in March this year, and they were given a platform in June this year by the Department of Water and Sanitation and were also honoured to be invited by the Water Research Commission.

Getting the technology to market readiness

According to Pontsho, the competitions they have participated in have raised enough capital for their organisation to develop further, through outsourcing

a prototype based on a laboratory scale proof-of-concept to demonstrate the principle. Now, it is time for the prototype to be practically applied to a pilot programme so that they can test how their intended market will respond to it, keeping in mind that this is not a final product. “Therefore, the next phase is to raise more capital to roll it out to a small and controlled study group so as to extract enough data to not only improve our innovation for market readiness but to also innovate business models based on the data we will be extracting,” he says. “The biggest lesson we have learned is that there is never a time when one stops learning. It is even more beneficial to an individual to apply what they have learned so that they don’t repeat their mistakes.”

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SA'S YOUNGEST WATER RESEARCHER INVESTIGATES MICROBEADS IN OUR WATERWAYS

At 13, Xera Vegter Maharaj has already made her mark in the research space as one of South Africa's future scientists. When she was doing Grade 7 in 2016, she received the Ciska Tempest Award for the Junior School Science Expo from her school, St Mary's DSG in Pretoria. Later on, the school selected her to participate in the Northern Gauteng Expo for Young Scientists 2016, where she was awarded with a Golden trophy.

As part of Youth Month celebration, the WRC invited Xera to share her microbeads research study at the youth event held at Constitution Hill on 27 July. Interestingly, young as she is, her research focuses on a very unique scientific subject: 'Microbeads and their impact on the environment in South Africa'.



Xera Vegter Maharaj

Xera had been asking herself if South Africans are aware of microbeads and their impact on the environment, more especially because some personal care products such as soaps and scrubs contain microbeads, leading them to be present in our water ways.

In her study, microbeads are defined as very small plastic spheres that measure 5 mm or less in diameter. They are usually made from polymers such

as "polyethylene but can be of other petrochemical plastics such as polypropylene and polystyrene."

"Microbeads are now found almost everywhere. Personal hygiene products such as toothpaste, shower gel, face washes, scrubs, and even some solid soaps that are advertised as exfoliating, often contain microbeads.

Additionally, some dishwashing and laundry detergents also contain microbeads, used for its gentle abrasiveness to 'lift off dirt,'" explains Xera.

While discussing her study, Xera shared that microbeads became popular during the 1990s as exfoliants, "which means, we have been flushing it down our drains, into our rivers and into the ocean for more than 20 years. Microbeads may seem harmless, but the truth is that they may harm the environment and ultimately endanger everybody's health."

The impact of microbeads on the environment

The report published by the World Economic Forum, authored by the Ellen MacArthur Foundation and McKinsey, says we are currently dumping one truckload of plastics per minute into the ocean. The report further notes that "If no action is taken, this is expected to increase to two [truck-fulls] per minute by 2030 and four per minute by 2050". In a business-as-usual scenario, the ocean is expected to contain one tonne of plastic for every 3 tonnes of fish by 2025, and by 2050 it will be more plastics than fish.

Xera further explains, "Microbeads act as sponges for toxins, so they can end up being 1 million times more toxic than the water around them. Since our wastewater treatment systems haven't been built to filter out things so small, microbeads often go straight through the filtration plant and into rivers, streams and the sea."

MICROBEADS FACE TO FISH

A TUBE OF FACEWASH CAN CONTAIN OVER 330,000 MICROBEADS

This means billions of plastic microbeads are flowing into our global waterways.



1,147 PERSONAL CLEANSING PRODUCTS CONTAIN MICROBEADS

1,147 personal cleansing products in the US and around the world contain micro-plastic particle abrasives (MICROBEADS), employed as exfoliant.

MICROBEADS ARE DESIGNED TO WASH DOWN THE DRAIN

1

WASTE TREATMENT

Many sewage treatment facilities do not capture synthetic, floating particles the size of microbeads that are only about a .5 mm in diameter.

2

SEWAGE OVERFLOW

During heavy rains, some treatment facilities let sewage overflow go directly into our waterways.

3

SLUDGE & FERTILIZER RUNOFF

Sewage sludge used as fertilizer, beads seep into soil, get into rivers/aquifers.

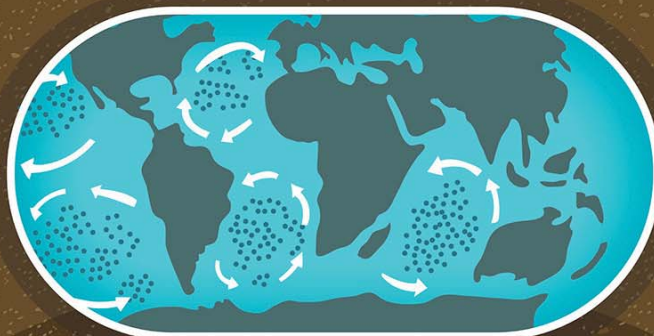
663 SPECIES OF MARINE WILDLIFE ARE AFFECTED BY PLASTIC POLLUTION

Over 663 species of marine wildlife are affected by plastic pollution through ingestion or entanglement. Micro-plastics attract other pollutants in the environment including PCBs, flame-retardants, and other industrial chemicals.

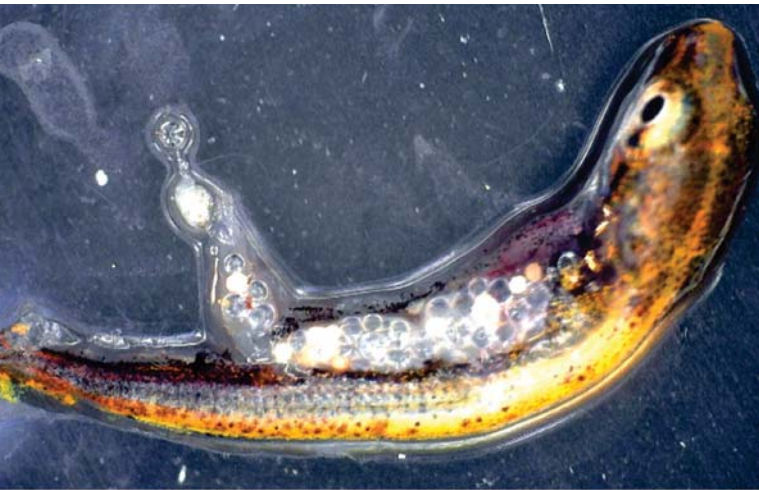
43,000 PLASTIC PARTICLES 5 Gyres found an average of 43,000 plastic particles /km² in Lake Erie.

A SINGLE PLASTIC PARTICLE CAN ABSORB UP TO 1,000,000 TIMES MORE TOXIC CHEMICALS THAN THE WATER AROUND IT.

Micro-plastic particles are being found in all oceanic gyres, bays, gulfs and seas worldwide.



(Image: Eluxe Magazine)



Micro-plastics are now present in a large percentage of fish

“In our rivers, dams and seas, microbeads are then mistaken for food or prey and eaten by fish, birds and other marine animals. Some of these proteins could eventually end up on our plates. This means that ,sooner or later, we will probably eat food that contains these miniscule plastic beads,” says Xera.

The inability of microbeads to naturally biodegrade is definitely a serious problem. Researchers at the University of California Davis and Oregon State University found that roughly 8 trillion microbeads are currently finding their way into streams and oceans every single day!

Hazard to human health

Microbeads can absorb toxins which are polluting our waterways, such as DDT and PCBs. These toxins are linked to cancer and reproductive problems. “Scientists worry that the beads and the toxins may eventually turn up on our plates,” notes Xera.

Experiments done by Rochman in the USA in 2015 noted that fish that ate microplastics saw an increase in glycogen depletion. The liver usually stores glycogen for energy when under stress. According

to the study, not only did the plastic-eating fish have less glycogen, they had excess fat cells in their livers which is an early sign of fatty liver degeneration and disease. For example, fish that ate plastic that had already absorbed toxins from being in California’s San Diego Bay, had the highest levels of fat in their livers. The study by Rochman further noted that tumours developed in the fish that ate plastic. Fish that were fed clean plastic had changes in their cells while those that ate dirty plastic experienced cell death.

Microplastic pollutants such as microbeads have been found in around 170 types of seafood that we commonly eat, such as mussels, lobsters, oysters and fish such as bluefin tuna and grey mullet, according to an analysis of 58 studies done by Greenpeace.

As for the microbeads in toothpastes, some of them get stuck in your gums. They are so small that it’s nearly impossible to get them out with an ordinary toothbrush. Having the microbeads lodged between our gums and teeth can cause gingivitis and other gum-related diseases.

Microplastic pollution in South Africa

Whilst not much research has been conducted about the extent of microplastic pollution in Southern Africa, the environmental magazine programme, 50/50 recently broadcast an insert entitled ‘Plague of Plastic’. This insert revealed that plastic particles were detected in over 70% of some of the fish species sampled from the coast of KwaZulu-Natal.

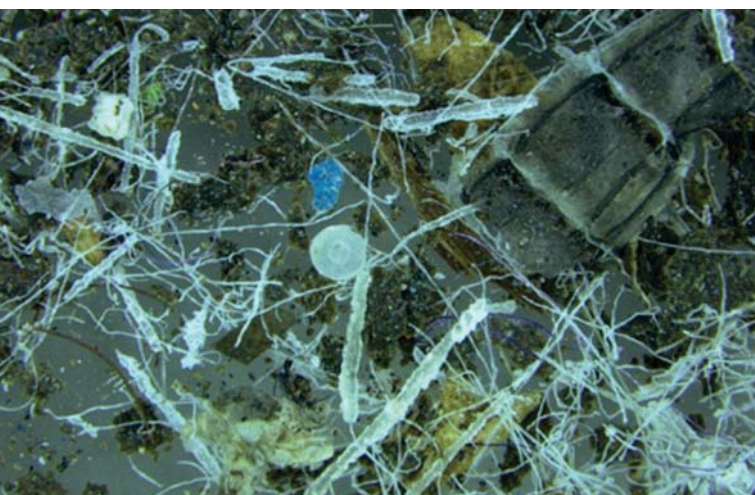
Furthermore, a quantitative analysis conducted by Nel and Froneman on microplastic pollution on the south-eastern coastline of South Africa found that microplastics are spread more or less evenly in sediment and water columns along this stretch of coast, with no significant difference between stretches of open coast and bays (2015). The

distribution of microplastic was found not to be linked with proximity of population density, but was rather mainly affected by water circulation.

Currently, South Africa does not have any national legislation regulating the use of microbeads in cosmetic products. Producers and distributors are also not required to disclose that their products contain plastic microbeads.

International response to microbeads

These dangers and other potentially harmful effects have led to countries such as Canada, the USA, and The Netherlands placing a ban on products with microbeads. The USA determined that all microbead products will be banned from shelves by 2018 through legislation signed into law in 2015. This regulation affords industry the opportunity to find alternatives to the utilisation of microplastics. Many other countries, for example, the UK, and regions like the EU, have pending regulations that may also ban the production and consumption of microbeads.



Dirty water sample with visually identifiable microbead and other plastic debris

Many transnational corporations, such as Unilever, Johnson & Johnson, Proctor & Gamble and L'oreal, have committed to replacing plastic microbeads in

their products over the next two years. But until such time, the responsibility lies with the consumer to make sure that they avoid using them.

Xera's study found that the average amount of microbeads in all of the products she tested was 3.21% and only Product 3 had a microbead proportion between 5 and 10%. Because of their minute scale, it is possible to put a lot of them into a bottle.

Moreover, the synthetic wax microbeads tested did not dissolve in boiling water and therefore will not dissolve when taking a shower and will thus contribute to microplastic pollution.

"My results further confirm that microbeads appear to go through treatment instead of getting filtered out by it, as there were microbeads present in both of the 25 litre water samples taken from the wastewater treatment plant," explains Xera.

"My hypothesis regarding people's awareness was partly correct and incorrect, as 59.5% of the people surveyed knew what microbeads were, but only 38.61% of them actually knew what impact they had on the environment," further notes Xera.

Xera says that while people in South Africa are aware of microbeads, they do not necessarily know about their impact on the environment. However, once people are informed about the matter, they are willing to ban the production and distribution of products with microbeads.

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THE IMVELISI PROGRAMME

Imvelisi is a partnership initiative between GreenMatterZA and the South African Young Water Professionals Network (YWP). This programme is funded by the Department of Science and Technology with the aim of supporting the business development of young water and biodiversity innovators and their ideas.

The Imvelisi Programme is as an ideation/ conceptualization phase training intervention for aspiring enviropreneurs. The purpose of the programme is therefore to ensure a streamlined innovation support system for young people considering careers in the water and biodiversity sectors by helping participants through the ideation phase of business development and preparing them for pitches to mentors, incubation programmes and early stage entrepreneurship investors.

To achieve this, IMVELISI brings together a dynamic group of 30-40 energetic young people in the water and environment sector and takes them through a week long bootcamp. The bootcamp equips these future entrepreneurs with the knowledge necessary to be able to assess market potential, structure a business proposal and partnership, and test the viability of their ideas and concepts with the aim of providing guidance towards successful implementation. Enviropreneurs that excel in the programme are offered mentorship support to take them through the most important phase of their start-ups, encouraging them to succeed.

Imvelisi Bootcamp participants, August 2017



KARABO MASENYADILOANA AND THE UBERIZATION OF WATER

The Imvelisi Bootcamp held at the WRC offices in July drew the attention of aspiring young business-minded youth from different parts of South Africa, all carrying a dream of taking their businesses to the next level. Karabo Masenyadiloana from the East Rand, was one of them.



Karabo Masenyadiloana

Growing up in a village where he had to walk long, difficult and often perilous daily distances to get water didn't just leave Karabo fatigued. On the contrary, this experience actually inspired him to find better and much more innovative ways of getting water to the people.

A budding young entrepreneur from Springs township, East Rand, remembers all too well his early childhood years in the village; getting water from the village pump meant standing in long queues in the morning and repeating the same process in the afternoon.

When he left for Wits University in Johannesburg, leaving his grandmother on her own to get water for herself under very testing conditions, Karabo started to seriously think about ways of simplifying the process of getting water for his beloved grandmother and many other villagers whose water was sourced in the same way.

Karabo completed his BA degree majoring in industrial psychology and philosophy at the University of the Witwatersrand in 2009. He then went on to take up several internships and took on formal employment in the retail sector with some of the major retailers in South Africa and abroad.

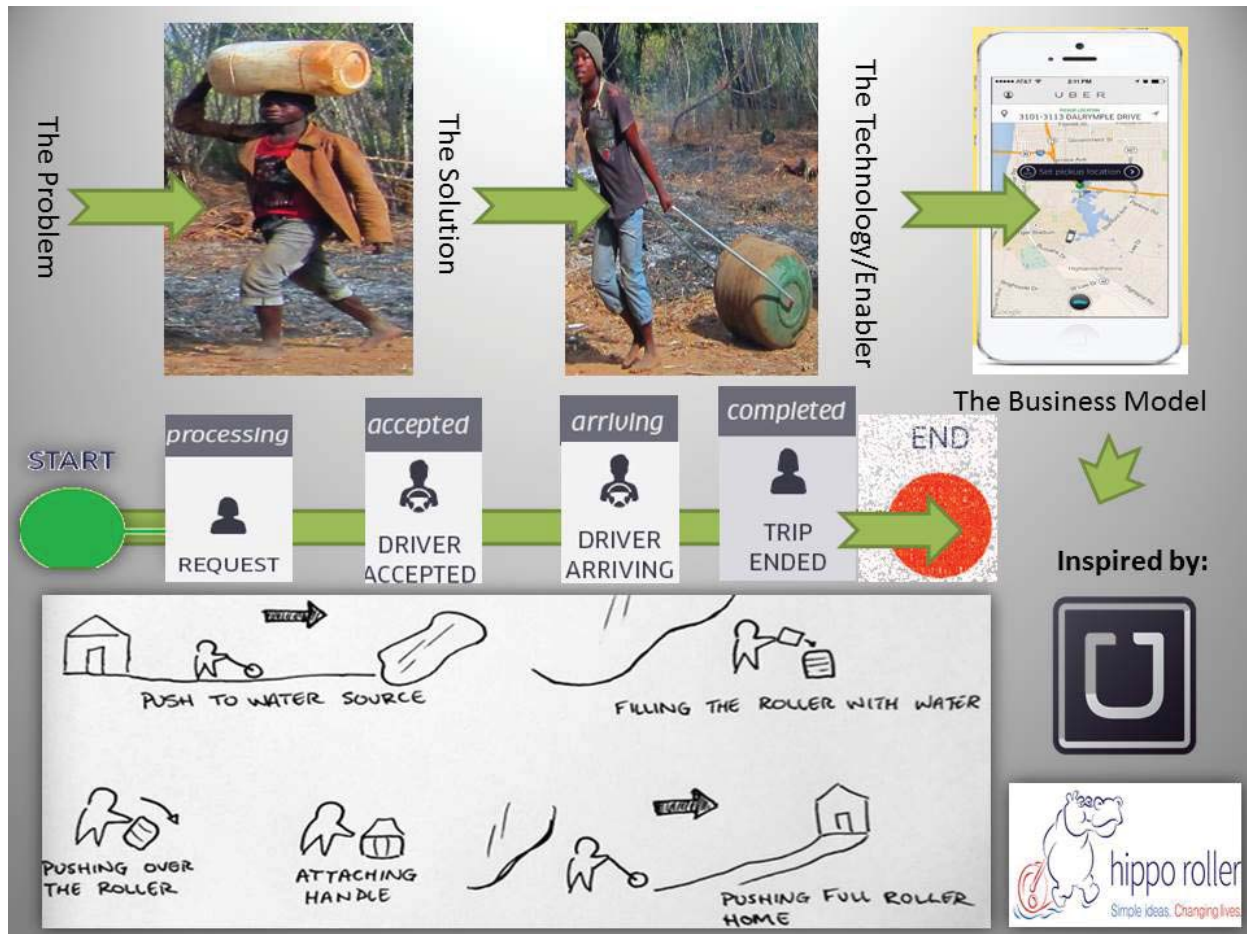
Karabo had not stopped dreaming. He founded his own enterprise, Dreameneur (Pty) Ltd, an organisation he describes as a path to influence, inform and inspire entrepreneurs in all fields to get active and start something.

Water innovation idea

Karabo speaks very proudly of his innovative water idea which he believes will have a significant impact on the lives of people, "I have developed a product that I believe connects elderly and disabled people in rural areas with improved access to water-on-demand", explains Karabo. "This new water concept is essentially a water delivery app and has been fondly called by many as the 'UBERization of water!'", says Karabo.

According to Karabo the innovation has a social impact in rural areas, such that the elderly and people with certain physical disabilities will experience improved access to water and in the quantities that they require, as usage will be monitored through a consumption and replenishment system.

In a country where unemployment, particularly among the youth, is alarmingly high, such innovations ought to be able to address this problem. Karabo says, "For local youth in villages where access to water is still a challenge, the Hipporollers provide the main mode of delivery. This provides employment opportunities for their households. In rural areas, the remuneration can be cash or bartering of fresh produce and food thus allowing them to provide for their families."



Karabo's business model

South Africa and Sub-Saharan Africa are faced with sporadic rainfall and persistent droughts. Water is a basic human right under the Constitution of South Africa. Every municipality has a mandate to freely supply each household with 6 000 litres of water per month. Although this is the case, access is still a challenge and providing uninterrupted access for households and commercial usage is a challenge that most South Africans deal with.

Karabo maintains that his service will ensure that consumers always have access to 'water-on-demand'. It allows for the smart metering of consumption through a feedback loop system that allows for better planning for distribution and the smart management of water and its supply, especially in

remote and rural areas with rough terrains and water sources that are in challenging locations.

Technical guidance and mentoring

Like many budding entrepreneurs, Karabo's journey hasn't always been a smooth ride. "The hurdles are many," he says. While he is passionate about his work, he could also use some help. "The biggest assistance for my idea to take off the ground would be some technical guidance and business mentoring, especially when it comes to the formulation of the business model," notes Karabo.

"Moving from ideation to implementation requires one to surround themselves with a network of experts that not only impart knowledge but also

provide a technical framework for conceptualization and ideation.”

It was precisely for this reason that Karabo’s participation in the highly-sought-after Imvelisi Entrepreneur Bootcamp was so rewarding, as it enlightened him on many aspects of business development and management. “This was my very first entrepreneurial bootcamp and I must say, it was beautifully co-ordinated. The content that was delivered was impactful in every way and the subject matter experts that availed themselves for presentations and consultations were so helpful and professional. I would, without a doubt, recommend the Imvelisi Bootcamp for every budding entrepreneur!” comments Karabo.

Responding to water challenges

In an environment where many entrepreneurs fall by the wayside, this passionate young entrepreneur sees himself learning a lot over the next five years.

“I foresee my business doing a lot to respond to the ever-changing challenges around access to water. I believe as time goes on new technologies will also advance and new methods and hardware will be developed to address these issues and thus the outlook will always be to continue creating innovative solutions that are meaningful to the end-users,” says Karabo.

Without a doubt, the future looks bright for young innovators such as Karabo. His confidence and passion is already pushing him towards realising his dream. “I am a firm believer in the notion that says, ‘You don’t have to be GREAT to START but you have to START in order to become GREAT’. A lot of people do not believe in their own capabilities. We need to cultivate a culture of trying, failing and trying again! There is no shame in failing but only in failing to try.”



LYNDRE NEL DEVELOPS AN INNOVATIVE TECHNOLOGY FOR ENVIRONMENTAL REHABILITATION FOR LANDOWNERS

Lyndre Nel is a science graduate from the University of Stellenbosch. She is a young woman on a mission to prosper no matter what comes her way. Above all, she sees herself very lucky to have been considered as one of the people to attend the Imvelisi Bootcamp mentorship programme recently held at the WRC offices in Pretoria.



Lyndre in action

Lyndre currently works as a project manager in Conservation Agriculture in the Cape Winelands. She grew up along the West Coast of the Western Cape and was schooled in Cape Town. Her passion and interest is in working with landowners and conservation agencies in promoting sustainable natural resource use and management.

Recognising that the farms in the Berg and Breede River region of South Africa are facing many challenges, such as lack of healthy vegetation causing the river banks to erode and invasive species pushing out the native trees, she joined forces with local communities, NGOs and young conservationists to restore degraded water catchments.

UBoomi, her company, looks to provide innovative technology for environmental rehabilitation to landowners. Lyndre developed an innovative

product called 'The Cocoon', a biodegradable planting tool produced by the Land Life Company, provides a water-efficient alternative to replanting indigenous trees back into areas cleared of invasive alien plants.

'The Cocoon' is a planting technology that provides a sustainable and scalable solution to plant large numbers of trees in degraded soils.

Lyndre says, "The Cocoon is designed to support a seedling through its critical first year, by providing water and shelter while stimulating the seedling to produce a healthy and deep root structure – tapping into the sub-surface water supply within its first year helps to sustain growth. Lyndre further says, "*The Cocoon produces independent, strong trees which are not reliant on external irrigation and can survive harsh conditions.*"



With South Africa being a water-scarce country, such innovations make a huge contribution towards solving the water challenges we face. According to Lyndre The Cocoon promotes improved natural resource management as it is water efficient and low maintenance. It contributes to improved plant survival rates in rehabilitation. Rehabilitation has noticeable benefits for farmers including the retaining of healthy top soil, less water use, clean

river water, and fewer floods. *Compared to standard irrigation and propagation techniques, local farmers in South Africa attest that the Cocoon opens up an entirely new way of rehabilitation for them.*

Like many other emerging entrepreneurs, Lyndre faces some challenges in her business efforts: "It's been difficult to understand the context within which my business will best function. Also, finding an appropriate business mentor has been a challenge for me."

After getting involved in the recent Imvelisi Entrepreneur Bootcamp, Lyndre was very excited. "I found the Imvelisi Bootcamp inspiring and thought provoking. We learnt about the current South African business environment, how to be an effective role player in it, and how to build a start-up successfully. The training opened up a new world of possibilities for me and my future. Another great experience was meeting the other participants, who gave support to each other and created a sense of community," she adds.

"After the post-training mentorship provided

through Imvelisi, I will have a better idea of how to take my business to the next level. At the moment, I need mentorship to help me choose a direction to take my business in, and to understand what steps I need to take to get it there."

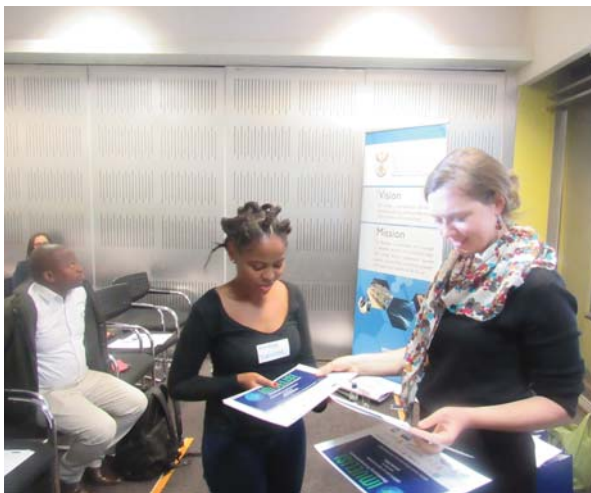
Being the energetic entrepreneur that Lyndre is, she sees herself running a successful business within the environmental restoration sector in the Western Cape. "There is an opportunity to take my business nationwide. In the near future, I see myself partnering with other businesses so that my company stays relevant and can effectively work with landowners on-the-ground to address their challenges."

According to Lyndre, as a young person you never really know where your life will lead you, so you need to find mentors and leaders that you can learn from. This is a message she sends out strongly to her peers. "There is always someone out there who is willing to help you, you just need to work hard to find them, then work hard to impress them, then work hard to impress yourself," she concludes.



MANDILIVE MATIWANE SETS HER ENTREPRENEURSHIP GOALS ON AGRICULTURE

Born and bred in a province that experiences some of the most frustratingly slow development progress, Mandilive Matiwane seems an undeterred young entrepreneur who is set on making her mark in the agricultural space. Mandilive hails from the village of Lenye, Keiskammahoek, in the Eastern Cape, where she, together with her peers, came together around a common cause to do their bit to ensure that the people of Lenye experience a flourishing agricultural sector.



Mandilive Matiwane with Shanna Nienaber

Mandilive is currently enrolled as a student under the Amanzi for Food Research Project at the Environmental Learning Research Centre at Rhodes University.

Together with her Lenye group members, she established a water conservation-based vegetable nursery which doubles as a demonstration site and knowledge-sharing and motivation platform around water harvesting and conservation in agriculture.

This idea emanated from a pressing need, which Mandilive defines as a real struggle.

“Earlier this year we were struggling to transplant our seedlings and there was a great demand and interest from members of the community who asked

to purchase our seedlings,” she says. “Seasoned and young farmers flagged the need for a nursery and the challenges they face with in this regard,” Mandilive explains.

Mandilive confidently says, “Our nursery will be our way of collectively playing our part through practising water harvesting and conservation. It will also be a platform for knowledge sharing and awareness for water issues and we hope to showcase how water is utilised in an communal agriculture space.”

Mandilive points out that, passionate as she is about her work, some situations can sometimes be very tough. “We are building our own organisational culture from scratch and it’s been very challenging,” she says. “And the lack of financial and technological resources in particular make our work very difficult.”

About Lenye Youth Group

Mandilive’s Lenye Youth Group is composed of seven young people from Lenye village who started working together towards the end of 2016. They pushed themselves to work on different interests for the sake of realising employment, development and community upliftment.



Mandilive with Lenye group members

Mandilive says, "We have a range of interests in different sectors such as the performing arts, arts and crafts, sewing and designing, sports, agriculture, etc." We decided to focus mostly on the agricultural sector, with our interest also ranging from livestock to poultry to crops, etc."

The group realised that a gardening project was a possibility in people's backyards. "Given that we have no financial resources, we figured gardening or vegetable farming would be the easiest and quickest way to build capital."

Members of the community offered to borrow us plots of land to plant in and to support our vision. We have verbally been granted 10 plots of land but we have managed to secure a written consent for two and have planted on one," she explains.



Member of the League Youth Group

We are harvesting potatoes but our other vegetables (beetroot, cabbages, butternut, and pumpkin) failed because we were not consistently working in the garden.

"Since we started, there has been a lack of human resources, as a small group continues with the

project. In some cases we have misunderstandings and commit mistakes on our part," notes Mandilive. "We decided to give preference to those who are not working at all and this leads to only a few participating. In addition to that, we believe we planted a bit late and that affected our yield. Lastly, we didn't have pest control measures due to lack of funding and knowledge."

"We have now gained knowledge of organic, cost-effective ways of doing pest control and will make use of these in the next attempt at planting. We are planting again in August. Hopefully, we can plant more than two plots but definitely we will plant on a minimum of two plots before the end of the year."

"Even though we officially have seven people as part of the project, the circle is getting bigger since we've cleared up the misunderstandings on who should be part of the project," says Mandilive.

We will now have a mix of both employed and unemployed youth working together in the project. Employed youth being those who have some sort of income from elsewhere and are less likely to be as readily available because of work-related time constraints. We will need to figure out the structure and culture of the organisation as time progresses.

Experience from Imvelisi Bootcamp

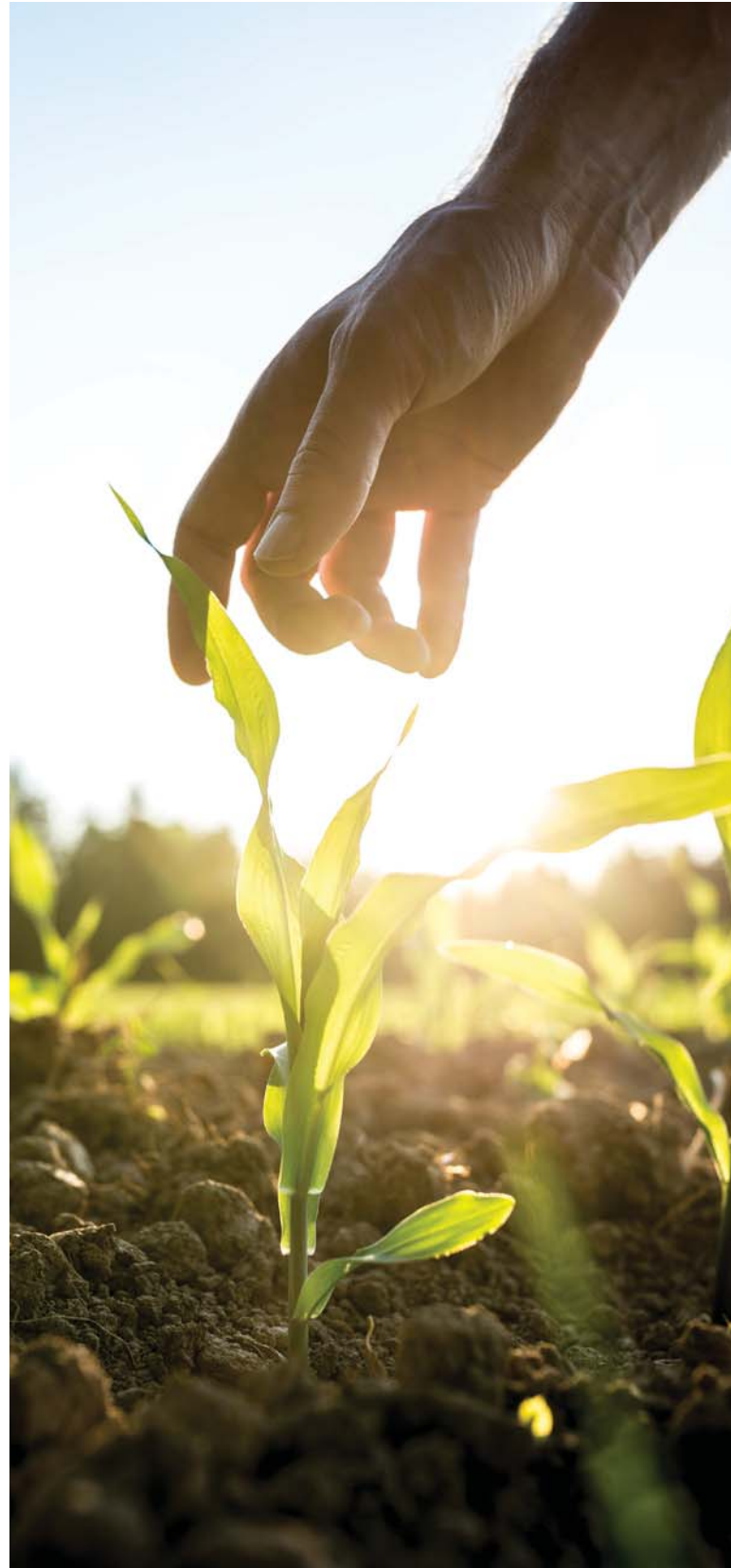
Commenting about the Imvelisi Bootcamp that she recently attended at the WRC offices, Mandilive says, "Imvelisi was amazing! I learned a lot and appreciate the fact that it was highly interactive and action-oriented. Meeting other young and emerging entrepreneurs was an eye-opener and I was impressed by the knowledge shared through the 'Hero Journeys' presentations."



WRC CEO Dhesigen Naidoo addressing the Imvelisi youth

In five years' time Mandilive sees herself being part of a well-oiled network of different stakeholders participating in the growth and development of Qoboqobo village in the Eastern Cape. One can only learn from Mandilive's words of wisdom, "Have a vision, know that it starts there. Work your way up. We started with just a piece of land in a backyard but now we have smallholder farmer land borrowed to us by community members where we are looking to grow our nursery. There's definitely something you can do. Don't undermine that small idea that passes through your mind. Get up and do it."

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NQOBILE LUSHOZI TAKES CITIZEN SCIENCE TO THE NEXT LEVEL

Nqobile Lushozi is as articulate in his speech as he is vivid in his ideas. Born, raised and schooled in the township of KwaNdengezi, Marianhill, KwaZulu-Natal, he went on to complete his undergraduate studies at the University of KwaZulu-Natal and is currently doing his Masters at the University of Stellenbosch.

The realisation that rainfall data is needed drove Lushozi to get up and put together an idea to get this job done.

“My idea is about developing a rainfall network in South Africa using a citizen science approach,” says Nqobile. “This involves using schools as point of measurement for rainfall data collection, because of their wide distribution in the country. Most of the schools are working with farming groups and ordinary citizens since there are already a number of people collecting rainfall data in their homes,” he adds.



Nqobile Lushozi, Stellenbosch University

Nqobile isn't just on a mission to collect data whichever way possible; rather, he intends working with ordinary people, particularly the young, as data collectors. He believes this will raise environmental consciousness of the people.

“Ordinary citizens have a role to play in our environment and the best time to begin to nurture this way of thinking is at a young age, hence my drive for working with schools,” explains Nqobile.

He believes that understanding the rainfall patterns is critically important, particularly if we are to survive our challenges of water scarcity. “Understanding patterns of rainfall is key in that this is one way we can begin to gauge water availability and understand how this is changing,” he says. He further argues, “A number of environmental problems (extending beyond water) are a result of a lack of awareness in our communities.”

But of course, as often said, “The bigger the ambition, the bigger the challenge.” Nqobile is no exception to the problems experienced by young entrepreneurs as he faces a number of challenges in his efforts. “As a young entrepreneur with an interest in environmental issues, the challenge for me is ensuring that my entrepreneurial ideas are in-line with the development agenda of my country,” he says.

For emerging young entrepreneurs like himself, Nqobile believes that building strong partnerships with larger institutions and NGOs within the citizen science space is one way for his projects to reach the desired destination.

Nqobile was amongst the privileged few young entrepreneurs selected to partake in the Imvelisi Bootcamp, an experience which he enthusiastically describes as “very inspiring”. “For me it was very helpful and inspiring because I went into the programme with just one idea in mind but I exited the bootcamp being aware of so many ideas around the environmental space.”

The bootcamp, he continued, “offered the

opportunity to interact with many experienced people in the environmental and business start-up space and also other amazing fellows known as enviopreneurs.”

In five years’ time, Nqobile sees the emergence of ‘Geographers for Change’, his company, being the go-to place for environmental monitoring data, monitoring more than just rainfall but also other important environmental variables. He excitedly points out:“I also see the data monitoring platform having a significant impact in our natural sciences learning space by offering learners a practical learning experience about environmental changes.”



Nqobile in a group discussion

Nqobile encourages other young South Africans to stand up do something. “I would say that let us learn to start where we are and with what we have. Sometimes we hold back on ideas because we are afraid of the unknown, and, really, we don’t have to figure out everything before we start, sometimes the best things lay in the journey ahead and unless we start, we will never know,” he concludes.

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FRANS NTSOERENG'S DREAM OF A GREY-WATER SYSTEM FOR SA TOWNSHIPS AND RURAL AREAS

Frans Ntsoereng was amongst the 30 innovative participants who took part in the 24-hour "Anti-Bullying Hackathon" competition. He won himself a trip to India in July 2017 to participate in Start-up Safari, "a global immersion programme that connects start-ups and entrepreneurs in emerging markets to the fastest growing start-up eco-systems around the world."

From that experience onwards, he has never stopped pushing himself to achieve the best that he possibly can.



Frans Ntsoereng

Frans is a young, passionate, energetic and futuristic man, who has been involved in youth and community development since 2007. Through this experience, he has had a chance to work with two international, three national and a number of local organisations, both in townships and rural areas of South Africa.

Frans's idea is to introduce and implement a grey-water reuse system, particularly in South African townships and rural areas. His idea is to install household water tanks that will enable citizens to reuse and recycle grey-water. He also dreams of having water tanks installed in such a way that they collect grey-water

from basins, showers, baths, and laundry and then redirect it to the toilets. The same water can also be used for gardening.

According to Frans, the system will lower water billing by up to 20–30% for those who are already paying up to R2000 monthly. "The system will not only benefit individual households but also township-based businesses, in particular start-up carwashes. The project will also implement ongoing community dialogues and workshops about the significance of water," he says.

Frans further says, "I would like to believe that I am responsible and a mindful South African citizen who understands the word 'patriotism'; therefore after seeing the impact of drought I then thought of what can be done to save the remaining water we have and how can we change citizens' mindsets and increase their awareness based on water usage. I realised that South Africa is using clean, fresh water to flush toilets; this is the water that can be used for bathing and for other things."

Government procurement limitations

According to Frans, SMMEs should be able to access and bid on government procurement opportunities in a smooth and efficient manner. In the case of the High-Tech Entrepreneurship Model, this would enable the application of technology entrepreneurship to solve service delivery problems at a community level. "I believe that the 12-week second phase of the mentor/mentee platform will enable me to explore and unlock possibilities within the new space," he says.

Imvelisi Bootcamp learning experience

The Imvelisi Bootcamp offered Frans a chance to meet experienced, passionate and energetic facilitators such as Mr Neil. "I would like to thank the organising team for finding relevant and

experienced facilitators like Neil.”

Frans says, “What I also took away from the Bootcamp was, amongst others, learning about new business models. More especially, ‘The fish-koi strategy; how to bring ideas to life: The Entrepreneur and the fish, plotting the entrepreneurial journey. Also, learning about the growth wheel helped me a lot. Breakaway sessions with experienced individuals; that session helped us as participants to rethink and relook at their ideas before the last day (pitch).”

Frans sees himself as a well-established, successful, down-to-earth, passionate and visionary entrepreneur, both personally and professionally, in years to come. Frans wants to continue adding value in building our South African society by implementing systems that will help our country to preserve its own natural resources.

South Africa needs people to join the water discourse and participate in and commit to policy-making decision platforms. Lastly, Frans is eager to share his knowledge and experience and support upcoming entrepreneurs by providing an advisory and mentorship role.

Positioning oneself and believing in possibilities

“Young people of this country should stop underestimating themselves; simply because they do not have experience or a qualification this doesn’t mean that they are disabled to provide great solutions,” he says. “For instance, I do not have any environmental experience; my field of work hasn’t got much to deal with science and technology, I am only from community and youth development sector. But still I did not sit back and do nothing instead. I was inspired by the fact that communities consume water for survival and for other different purposes. When Imvelisi made a call for applications,

I saw an opportunity that shouldn’t be missed or that I couldn’t afford to lose.”

“I see myself fortunate enough to be selected out of a number of applicants, and to be amongst the 50 participants selected and amongst only 15 selected for the second phase. It is all about positioning yourself and believing in possibilities,” says Frans.

“In conclusion, I would like to share 6D’s to unlock youth destiny: Dreams, Direction, Determination, Discipline, Dedication and Desire. Always remember that daily decisions determine your destination.”

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TECHNOLOGY TRANSFER OFFICE LAUNCHED AT THE WRC

The South African water sector has a big task of ensuring that the public gets reliable and safe water supplies and to dispose of wastewater safely and in compliance with national water quality regulations. Water use in agriculture, sanitation and industrial usage of water count amongst the key uses of water for the public. This work could be made possible by different forms of work within the sector. One of the main outputs of the research community is water technology innovation. To overcome some of the barriers that may occur in the process of technology development, the WRC Innovation and Impact Branch has recently launched the Technology Transfer Office with the purpose of maximising the impact of the Commission's work in the country and the rest of the world.



Picture from left : , Evah Phago, the Technology Transfer Analyst, Thabo Mthombeni, Technology Transfer Manager, and Thembi Ntlemeza, the Technology Transfer Officer

Thabo Mthombeni, the newly appointed Technology Transfer Manager, took time to share with us what the work of their office actually entails. "Achieving impact in South Africa is our priority consideration guiding our decisions and approach to technology transfer for the Commission entrusted with the country's water research. The value proposition of

this newly-established TTO will be to maximize the impact of water research in South Africa, Africa and the world. This will be done through strengthening the technology transfer activities within the organisation," says Thabo.

Main focus of the WRC Technology Transfer Office

Thabo further notes that the office coordinates all intellectual property and research outcomes. "Such outcomes include products, services or technology packages. Given the research mandate of the WRC, this Office will not only focus on outcomes limited to registerable intellectual property but also innovation and know-how." "This is a process of taking novel ideas, research and knowledge developed within the WRC's mandate and translating them into useful outcomes that have a direct and positive impact on the WRC's stakeholder environment," he says.

The Technology Transfer office aims to support the WRC's mandate and achieve its vision by:

- Providing support and advice to research managers in market research, commercialisation and technology transfer activities
- Building networks with relevant stakeholders and funding organisations and linking opportunities with funding
- Creating a technology transfer policy environment conducive to innovation
- Increasing technology transfer awareness and providing relevant capacity building interventions and opportunities

According to Thabo, the Technology Transfer Office has the vision to create a structured process that ensures return on investment, and societal and economic impact by creating, securing, protecting and exploiting all forms of intellectual assets at the WRC.

“Our broad initial undertaking will be to mine the current WRC database for research, development and innovations that are available for intellectual property protection and commercialization for both economic gain and social good,” says Thabo.

Thabo further adds that the WRC currently has a portfolio of 57 patents, which have not necessarily been proactively managed to gain commercial value over the past few decades. New and emerging opportunities within the WRC portfolio and Lighthouses will also be reviewed to provide strategic guidance on their level of readiness to market. This thrust will develop a process of matching WRC research and innovation to national priorities and needs. “The WRC TTO will explore opportunities for providing advisory and scanning services to the sector and develop and manage strategic forums and platforms relating to IP management in the water sector, technology transfer, partnerships, start-ups, entrepreneurship, pre-commercialization and commercialization,” he says. “We envisage this Office supporting the realisation of products and services that will eventually change the lives of ordinary South African citizens.”

Technology Transfer staff

Leading this unit, Thabo works with two other staff members, Evah Phago, the Technology Transfer Analyst, and Thembi Ntlemeza, the Technology Transfer Officer. With this Office in place, it will now be possible to see the increase of the ‘deal flow’ of licences and start-ups emanating from water R&D.

Commenting on their new work at the Commission, Eva says, “The Office will increase the number of water sector licences and start-ups through improved relationships and interaction between our office and South African water sector R&D; focusing on maximising impact. Our complementary role will be to feed the water innovation ecosystem through the sustained building of strong networks with stakeholders, funders and entrepreneurs such as the Department of Science and Technology, Technology Innovation Agency, Department of Trade and Industry, Industrial Development Cooperation, NIPMO, VC funds, The Innovation Hub and other incubators.

Technology Transfer offerings include:

- Simplifying how to do business with the WRC and the water sector
- Ensuring that protectable IP is protected by appropriate means (secrecy, patenting, copyright)
- Promoting the identification of IP of potential value
- Supporting the utilization of IP (licensing, venturing)
- Increasing internal awareness of IP and technology transfer and external awareness of WRC successes and opportunities (in collaboration with the R&D Office and Marketing & Communications)

Patents, water research and intellectual property

Shedding more light on the issues relating to patents Thabo says, “A patent is a right which describes an invention; be it a new or improved process, a device, or a new chemical compound. The effect

of a patent is to allow the patent holder to exclude others from exploiting the invention described in said patent for 20 years, unless they receive the consent of the patent owner to do so. In return for this exclusion right, the patent holder must fully disclose the technology. This effectively allows others to, among other things, improve upon or refine the invention. Therefore, patents are a means to spur further innovation, stimulate the development of new markets, and diffuse technology and other knowledge to the public.”

Thembi adds, “Patents are available for any invention that has not been previously disclosed anywhere in the world, with the provision that the invention is novel, non-obvious, and is capable of industrial application.” She further highlights that patenting in South Africa is regulated on the basis of the Patents Act 57 of 1978. “Furthermore, the Companies and Intellectual Property Commission (CIPC) is the custodian of all patent applications that are filed within the Republic. On a basic level, patents and the rights afforded by them serve as an incentive for researchers to innovate, thus serving the dual nature of encouraging invention and the dissemination of technology and knowledge.”

Thabo further explains, “Another important feature of the exclusion right afforded by a patent is that the patent becomes an asset to the holder; an asset which can be exploited and leveraged, just as can be done with any other asset. One of the major roles of patents in this space is to incite partnerships between research institutions who come up with these innovations, and implementation partners (be it private companies or other research institutions) who would assist in the rolling out of such technologies. In this scenario, a patent would then play the role of leveraging an asset in exchange for resources.”

“Research and development around water is not only undertaken to answer the science community’s burning technical questions, but also because clean water is one of the natural resources in danger of running out in our country,” explains Thabo. “In this regard, water innovations have the potential to make this basic human right available to the masses through technologies ranging from purification systems to effective water management procedures. And, as previously mentioned, patents (and other intellectual property rights) can facilitate this process by providing an incentive for researchers, as well as giving inventors leverage in water-related business transactions,” he says.

Although they are a relatively a small group, South African researchers involved in water-related research rank 19th in the world. There exists a disconnect in the water-related research activities undertaken throughout the country, with some institutions working in silos. As a result, similar IP is being developed by different institutions; a very counter-productive approach. The WRC TTO aims to become a central hub for water knowledge, not just within the organisation but within the water sector, thus helping to facilitate the much-needed partnerships that will consequently move water innovations along the entire value chain towards implementation, in a more strategic and cohesive manner.

South Africa has the potential to lead Africa in the transition towards a water-smart economy, with new technologies and enterprise innovations that will ensure our water security. Intellectual property rights are at the heart of making this a reality.

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ABOUT WIN-SA

WIN-SA aims to capture the innovative work of people tackling real service delivery challenges . It also aims to stimulate learning and sharing around these challenges to support creative solutions . Most importantly , WIN-SA strengthens people -to -people learning . This document showcases best practice and promotes lessons sharing . To comment , make addition and further input , please send email to info@win-sa.org.za .

Our mission is to ensure that the body of knowledge in the water sector is well managed, readily available , accessible and applied , leading to improved decision making and performance especially at local government level.

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