

Water & Sanitation Africa

Complete water resource and wastewater management

MTN Business Smart Water Where utility management meets intelligence

**DIGITAL
TOOLS
FOR WATER
LOSSES**

**MUNICIPAL
WATER DEBT:
AN EXISTENTIAL CRISIS**

**A NEW DEFENDER EMERGES TO
TACKLE WATER POLLUTION**

"The MTN Business Smart Water platform offers more than just a data dashboard; it's a tool for fostering sustainable growth, building stronger infrastructures, and empowering communities."

Sudipto Moitra GM ICT Solutions MTN Business



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ON THE COVER
 In today's increasingly connected and sustainability-driven world, managing water efficiently is not only an economic necessity, but a key responsibility for individuals, businesses, and municipalities. **P6**

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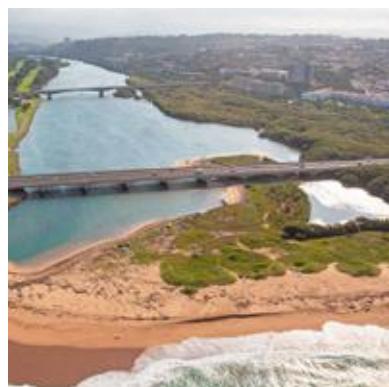
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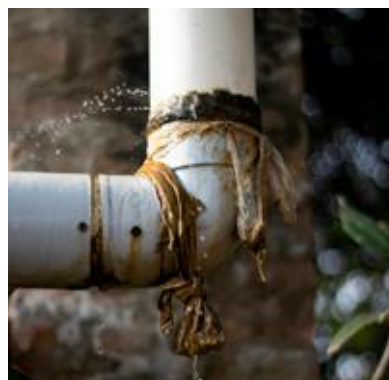
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Water & Sanitation Africa

Complete water resource and wastewater management

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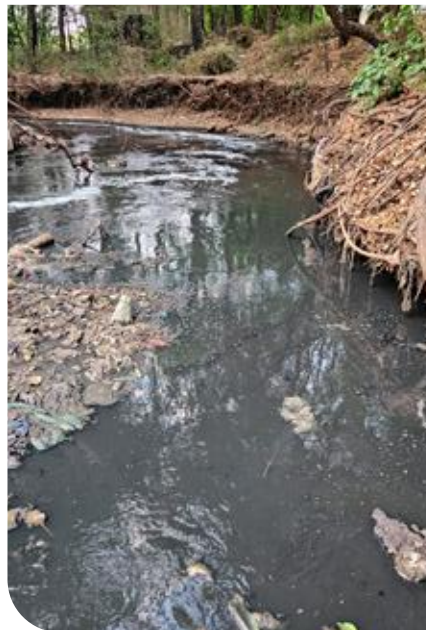
infrastructure-news





This is the Resource edition, and instead of writing about the dismal state of our water resources, I thought I would show you recent pictures of the Hennops, Jukskei and Sandpruit Rivers.

Caption this.....



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Inspiring passion for water

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- Anaerobic Sludge Processes
- Industrial Water
- International Water Association-Southern Africa (IWA-SA)
- Innovation for Water Supply & Sanitation
- Mine Water Lead
- Process Controllers
- Small Wastewater Treatment Works
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- Water Reuse Division
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EMPOWERMENT PLATFORMS

- Women In Water
- Young Water Professionals



The ABC logo is a valued stamp of measurement and trust. WISA is ABC audited and certified.

Water quality tests were conducted on three Johannesburg Rivers – Sandpruit, Braamfontein Spruit, and Jukskei – within a 10 km radius of Rivonia, Bryanston and Glenferness. Not surprisingly, all rivers tested positive for e.Coli.

Get involved. Get outraged, start contacting your municipalities. This should scare you. These are photos from Tarryn Johnston, Founding Director of Hennops Revival. Visit their website <https://hennopsrevival.co.za/> to find out how you can make a difference. ●

Kirsten



COVER OPPORTUNITY

In each issue, **Water & Sanitation Africa** offers companies the opportunity to get to the front of the line by placing a company, product or service on the front cover of the magazine. Buying this position will afford the advertiser the cover story and maximum exposure. For more information, contact Sindi Moni on +27 (0)82 212 4574, or email sindi@infrastructurenews.co.za.

You said it in WASA

The opinions and statements shared by thought leaders in the water industry to Water&Sanitation Africa.



“Water is one of the most precious resources on the planet, and MTN Business Smart Water empowers users to manage it responsibly and efficiently. With MTN Business Smart Water, users are not only investing in state-of-the-art water management technology but also joining a global movement toward responsible, sustainable utility management. The platform offers more than just a data dashboard; it’s a tool for fostering sustainable growth, building stronger infrastructures, and empowering communities. In an era where intelligence and connectivity redefine daily life, MTN Business Smart Water is positioned as the future of water management, making it not just a solution but a smart choice for a better tomorrow.” **Sudipto Moitra; GM ICT Solutions MTN Business**

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“WISA brings together experts from a wide range of disciplines to meet, discuss, plan for and present solutions for a sustainable water future in the region. We want to lead in strengthening strategic partnerships within the sector, while playing an active role in encouraging robust water discourse in the public domain. Join our divisions, participate in our events and take part in our courses. By working together on these aspects, we can build a more sustainable and accountable water future for everyone.” **Dr Lester Goldman, CEO, WISA**

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“If we are to genuinely address our highly complex water problems, water sector professionals must all join hands to realise our common aspirations in a more systemic manner. A systems analysis framework is therefore necessary to provide optimal and sustainable water and sanitation services; as such a framework considers water and sanitation infrastructure, appropriate required technologies, socio-economic significance of water and sanitation, and challenges in the enabling environment.”

Dr Harrison Pienaar, Chairman, WISA

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“Every sector needs that one organisation that holds everything together, the glue. WISA is that for water. With its relatively small board, WISA’s mouth is big, its reach is large and it allows people from competing initiatives to stand on neutral ground and come together and work towards the bigger picture. WISA allows people to bring their expertise and work together in a way that facilitates systematic change.” **Dr Jo Burgess, head: Trial Reservoir Global Services**

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“The adoption of high-quality HDPE pipelines presents a long-term solution to South Africa’s water infrastructure challenges. With a potential lifespan of up to 100 years, these pipelines offer durability, cost-efficiency, and sustainability, helping to combat the country’s ongoing water losses due to aging infrastructure. Fortunately, more tenders and clients are recognising the importance of using virgin polymers and SAPPMA certified products.”

Jan Venter, CEO of the South African Plastic Pipe Manufacturers Association (SAPPMA)

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“Water pollution in South Africa has worsened, and it has worsened largely due to the collapse of municipal governance. By not properly planning for, operating, maintaining or building water and sanitation infrastructure, raw sewage is running down some streets in this country and our dams and rivers are being polluted by broken down wastewater treatment works. This had led to the proliferation of alien invasive plants such as the Water Lettuce in the Vaal River and the Hyacinth in Hartebeespoort Dam.”

Isaac Sello Seitlho, Deputy Minister, Department of Water and Sanitation (DWS)

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“There was increased interest in our water quality monitoring tests after the 2022 Durban floods damaged the city’s wastewater treatment and sanitation infrastructure, resulting in high levels of E. coli in rivers and beaches. There is a strong correlation between extreme rainfall events and pollution in our rivers and seas.” **Nicole Martens, director, Talbot**

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“It is important to understand that both marine and freshwater systems are transient. Any sample that we take is representative of the concentration of the contaminant at that point in time at that location. If a sample is taken ten minutes later, results may differ. This is why it is incredibly important to analyse trends over a period.” **Carl Haycock, CEO, Talbot**

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“In addition to determining the needs of the company, there is a civil engineering component to constructing a water storage solution. Various plans and approvals need to be made. It is also important to have a good overview of the water use in a business’s operations. Very often, companies need less water back up than what they think if they just manage their available water a little better.” **Ebrahim Patel, head of engineering at Tsebo Facilities Solutions**

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“Laboratory equipment and technology is changing at a rapid pace. Instruments that used to fill a whole room can now sit on a benchtop. Laboratories need to invest in new equipment to get lower detection limits. There is a lot more flexibility and new ways in testing water where dirtier water samples can be tested without damaging the instruments.”

Joanne Barton, managing director of M&L Laboratories, a Bureau Veritas facility

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“The more sustainable answer to today’s water challenges can be found in the water stewardship approach, which considers not just a company’s on-site conditions but the broader catchment,” she says. “Industries within a catchment will face similar challenges, so they need to see the bigger picture and strive for closer collaboration in the ways that they develop solutions.” **Tamaryn Hale, principal environmental scientist, SRK Consulting**

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“While the non-access to water affects everyone, the burden is most heavily placed onto the shoulders of the women and girls of the community. Every morning, as the sun rises groups of young girls leave their homes before daybreak, setting off on a long, often unsafe journey to find water. Carrying jerry cans, these girls walk for miles to the nearest water source, often an open well or a distant stream. The search for water consumes their entire morning, leaving them exhausted and late for school or, in many cases, unable to attend school at all.” **Francis Ogola Ndonga, director, Lifewater Community Kenya**

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“Even though there is an increased adoption of ultrasonic meters (mostly by the private sector) as the price of the technology declines, Honeywell favours volumetric meters for South Africa because of the value they provide. Firstly, they can be installed at any orientation, reducing any installation errors. They also have a built-in strainer that can filter out impurities and a reasonable amount of sand and grit can pass through its pistons.” **Jacques-Louis van der Linde, senior account manager, Honeywell**

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“The more redundancy built into a water system, the costlier the water system. It is a balance between how critical the infrastructure is and the client’s budget.

When deciding on redundancy, one must consider the associated cost with a water system failure and the cost of redundant features. Redundancy is also linked to the maintenance of the system itself as well as the maintenance all the redundancy features.”

Matthew Funnell, Associate Engineer, AECOM

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MTN *Business* Smart Water

Where utility management meets intelligence

In today's increasingly connected and sustainability-driven world, managing water efficiently is not only an economic necessity, but a key responsibility for individuals, businesses, and municipalities.

“**T**he MTN Business Smart Water solution addresses this need, marking a transformative shift towards smarter, more sustainable water management. This solution empowers users with real-time data, actionable insights, and unmatched adaptability, allowing them to make informed decisions and optimise water usage to prevent wastage and leaks. MTN Business Smart Water is more than just a product; it's a pathway to a sustainable future where utility management meets intelligence,” says Sudipto Moitra; GM ICT Solutions MTN Business.

Real-time data for smarter decision making

One of the core features of the MTN Business Smart Water solution is its intelligent water meters, which provide real-time data on water usage patterns.

This granular information is accessible through a visualisation platform, which allows both users and administrators to monitor water usage in real time, leading to actionable insights and more efficient resource management. Whether it's a business wanting to control costs, or a municipality needing to plan for demand, MTN Business Smart Water has the tools to enable better decisions.

For users, the MTN Business Smart Water meters simplify the complexities of water management. With advanced data analytics, the meters anticipate user needs and optimise water flow for efficiency. Furthermore, the MTN solution integrates seamlessly with other devices and systems, ensuring that users have easy access to crucial information for informed decision-making. This ensures that water resources are used optimally, helping to lower utility bills, reduce waste, and prevent unnecessary leaks.

“MTN Business Smart Water is designed not only to meet individual needs but to contribute to a broader mission of large-scale resource optimisation. For enterprises and municipalities, the data aggregation capabilities of this solution are invaluable. With a complete end-to-end view of water usage, city planners, utility providers, and large corporations

can make data-backed decisions for efficient water resource allocation. This solution aids in the migration from outdated, legacy water meters to smart, digital ones, thus empowering utilities to take a proactive approach in managing resources,” adds Moitra.

How does MTN Business Smart Water work?

The core of MTN Business Smart Water lies in its ability to gather, transmit, and analyze field data with the help of state-of-the-art smart meters. These meters are installed within municipal households, businesses, and other establishments, where they capture critical information on water usage patterns. Field service data workers equipped with connected devices can gather, organize, and feed this information into the MTN Business platform. The data then flows to a visualization platform where stakeholders can access it with ease, transforming raw data into valuable insights at a glance.

Differentiating MTN Business Smart Water

What sets MTN Business Smart Water apart is its unique set of features that address specific challenges faced by utility managers, municipalities, and enterprises.

1 Reliable connectivity across networks

MTN Business Smart Water meters are equipped with SIMs that offer multi-carrier connectivity within a

Sudipto Moitra,
GM ICT Solutions MTN Business

single country, ensuring consistent, uninterrupted service. Most other solutions offer single-carrier coverage, making them susceptible to disruptions. By integrating reliable connectivity, MTN Smart Water meters can maintain data flows from even the most remote locations, a critical advantage in regions with inconsistent network coverage.

2 Flexibility in deployment

As a leader in telecommunications across Africa, MTN leverages its expansive network to facilitate easy deployment of smart meters in diverse settings. MTN is committed to collaborating with businesses and municipalities to create customized solutions that fit the unique needs of each deployment. This tailored approach ensures that each MTN Business Smart Water implementation is optimized for success.

3 Over-the-air updates for ongoing improvements

MTN Business Smart Water supports over-the-air (OTA) updates, allowing smart meters to stay up-to-date without the need for manual interventions. This feature ensures that users always benefit from the latest functionalities and security enhancements, reducing maintenance overhead and improving operational efficiency.

4 24/7 technical support

With round-the-clock technical support, MTN Business Smart Water users can enjoy peace of mind, knowing that experts are available to assist whenever needed. Whether a user is troubleshooting a technical issue or seeking advice on optimizing water

management, MTN's customer support team is always on standby.

5 Scalable solutions for growing businesses

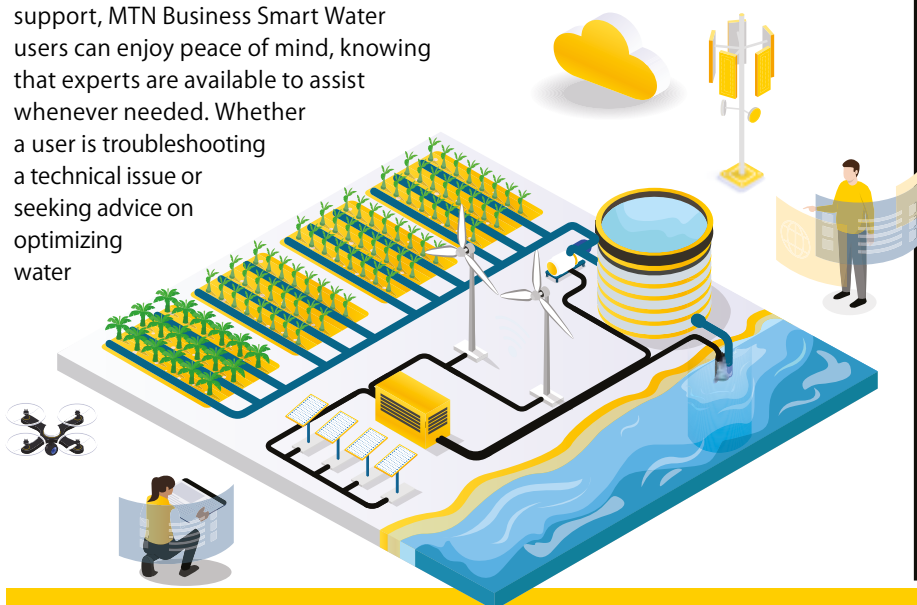
MTN Business Smart Water is designed to grow with its users. As businesses expand or municipalities add more households to their networks, they can easily scale up their use of smart water meters, ensuring that their systems keep pace with their needs. This scalability makes the solution suitable for both small projects and large-scale, city-wide implementations.

"Water is one of the most precious resources on the planet, and MTN Business Smart Water empowers users to manage it responsibly and efficiently. With MTN Business Smart Water, users are not only investing in state-of-the-art water management technology but also joining a global movement toward responsible, sustainable utility management. The platform offers more than just a data dashboard; it's a tool for fostering sustainable growth, building stronger infrastructures, and empowering communities. In an era where intelligence and connectivity redefine daily life, MTN Business Smart Water is positioned as the future of water management, making it not just a solution but a smart choice for a better tomorrow," concludes Moitra. ●

KEY BENEFITS OF MTN Business Smart Water

The benefits of MTN Business Smart Water are numerous, from streamlined data collection to efficient resource management. Here are some of the standout features:

- **Field data acquisition and management:** MTN Business's Field Data Management tool allows for streamlined acquisition of data, which is essential for informed decision-making.
- **Migration from legacy to smart meters:** By transitioning from outdated meters to advanced smart ones, MTN Business Smart Water ensures accuracy, timeliness, and scalability in data collection.
- **Tampering event notification:** The system is designed to detect and report tampering incidents, helping to prevent unauthorized usage and water theft, ultimately saving resources and costs.
- **Leak detection and consumption monitoring:** Continuous monitoring enables early detection of leaks and excessive usage, allowing swift interventions before issues escalate.
- **End-to-end utilities management dashboard:** The comprehensive dashboard allows real-time utilities management, facilitating a proactive approach to water use and conservation.
- Each of these features supports MTN's goal of making utility management as seamless and sustainable as possible, whether for small businesses, large enterprises, or municipal authorities.



For more information on MTN Business Smart Water visit www.mtnbusiness.co.za





Effective water governance helps to ensure that water resources are managed in a transparent, accountable, and equitable manner and that water services are delivered in a way that meets the needs of customers while also being financially sustainable. **By Dr Lester Goldman, CEO, WISA**

STRENGTHEN MUNICIPAL GOVERNANCE FOR A SECURE WATER FUTURE



Several factors contribute to water crises in our communities. Here's how we can improve:

- 1 Clear legal framework:** Strong, clear laws and regulations help municipalities operate effectively and hold them accountable. We encourage COGTA and stakeholders to review and update these for improved performance.
- 2 Transparency and openness:** Open communication and access to information are key. When municipalities are transparent, it builds trust and allows citizens to be involved. This often leads to better service delivery as well.
- 3 Public participation:** Including the public in decision-making processes creates a sense of ownership and improves outcomes. Mechanisms like public meetings, feedback systems, and community engagement can make a big difference. Strong relationships with communities are vital. Understanding community needs allows municipalities to better serve them.
- 4 Sound financial management:** Effective budgeting, financial reporting, and auditing are crucial. Strong financial governance helps prevent misuse of resources and ensures they are used efficiently to serve the community.

5 Independent oversight: Strong oversight bodies like independent board members, audit committees, and anti-corruption agencies are essential. We can support and advocate for strengthening these bodies.

6 Capacity building: Investing in the skills and capabilities of municipal staff leads to better performance. WISA is committed to playing a role in this, particularly regarding professional process controllers.

7 Political leadership: Elected officials who prioritise ethical governance and accountability are crucial. We can encourage this through capacity building and promoting the professionalisation of the public sector.

8 Technological solutions: Technology and AI can play a role in improving transparency and

accountability. Let's explore innovative solutions in all technical sectors, following the lead of the water sector.

9 Cultural values: Promoting societal norms and values that prioritize integrity and public service can foster improved accountability within municipalities.

WISA brings together experts from a wide range of disciplines to meet, discuss, plan for and present solutions for a sustainable water future in the region. We want to lead in strengthening strategic partnerships within the sector, while playing an active role in encouraging robust water discourse in the public domain. Join our divisions, participate in our events and take part in our courses. By working together on these aspects, we can build a more sustainable and accountable water future for everyone. ●



SYSTEMS APPROACH TO ACHIEVING CLEAN WATER AND SANITATION FOR ALL

If we are to genuinely address our highly complex water problems, water sector professionals must all join hands to realise our common aspirations in a more systemic manner. **By Dr Harrison Pienaar, chairman, WISA**



There are various key water management and related institutions at both national and local government level that all play a critical role (one way or the other) with respect to water supply and sanitation services. Water and sanitation management and related functions performed by these institutions cut across national level and local government spheres, as water and sanitation services to end customers derive from efforts by these institutions that are tasked with key water and sanitation management functions: water resource management, bulk water supply, water treatment and distribution, and wastewater treatment.

Key institutions like DWS and its entities TCTA, Water Boards, Water Use Associations, local government and municipalities all play a critical role in the South African water sector value chain. This implies that multiple plans are being produced as part of, or relating to, water and sanitation management by different key role players. From a systems perspective, this poses a significant challenge connected to the integration of plans for analysis and design of multifunctional water management options.



Need for systems approach

Multiple plans are thus produced by a range of key water and sanitation management entities across the South African water and sanitation landscape, across different time planning horizons covering the same spatial areas; and as a result, a range of strategic and operational water management options are designed and implemented without fully understanding what the system-wide pros and cons are for the water and sanitation management system as a whole and how their performance could be compared across concurrent plans.

Plans are also developed using multiple non-interoperable simulation models for specific infrastructure

systems and planning objectives as it relates to infrastructure for water resources, regional bulk (potable and non-potable), municipal and sanitation services. These plans can therefore not be easily integrated to enable results comparison and cross-plans evidence for co-benefits and/or trade-off of proposed water and sanitation management options.

Moreover, plans are designed to target specific water and sanitation management aspects (water resources, flooding, droughts, water and sanitation infrastructure), and are separate from local government planning, which results in water and sanitation management options being designed and evaluated without maximizing its multifunctionally.

A systems analysis framework is therefore necessary to provide optimal and sustainable water and sanitation services, as such a framework considers water and sanitation infrastructure, appropriate required technologies, socio-economic significance of water and sanitation, and challenges in the enabling environment. ●



A SYSTEMS ANALYSIS FRAMEWORK CONSIDERS HOLISTIC UNDERSTANDING OF

1. Water and sanitation governance and risks
2. Appropriate infrastructure for water and sanitation
3. Integrated catchment management
4. Sustainability and continuous improvement

BREAKING BARRIERS FOR INNOVATION:

PROF JO BURGESS ON EMPOWERING YOUNG WATER PROFESSIONALS

Prof Jo Burgess has 25 years of experience in the water sector. An early champion of sustainability she has actively helped the sector change and grow into the space it is today. **By Duncan Nortier**

Sustainability can feel like a buzzword, it is everywhere these days but Jo says, "It wasn't always like this. Nowadays people are more open to being green but for a while there was scepticism." Working in the industry for 25 years means that Jo has seen radical shifts in real-time, and she was often part of these shifts.

Sustainability over the years

Working in water means directly confronting some of the harsh realities that our modern world offers. When asked about what is the biggest problem we are facing in the water sector and the world Jo says, "Well, climate change affects everything and when I am talking to scientists and other stakeholders we all agree that there is a problem but the reality is that climate change is affecting us now, not in the future and getting people to wake up to this is challenging despite the evidence." Prof Jo is currently in the UK and says, "South Africa and the UK are facing similar problems. Where the standard weather patterns of our seasons have drastically changed over the last very short space of time. In the UK, the summers are uncharacteristically hot. In South Africa, we are getting much hotter

Prof Jo Burgess



summers, but much colder and longer winters." With her years of experience, she has adopted the moniker 'Water-related innovation accelerator' which speaks to the urgency of getting things right. She says, "We are living in a pivotal time, with a disproportionate burden placed on us, this is the time to do what we can."

Climate change has brought the concept of sustainability to the forefront of every discussion within various sectors and what Jo keenly notes is that "Sustainability means different things to different people in different sectors." The mining sector is inherently unsustainable, the extraction of finite resources is never going to be 100% green but "even in mining we can reduce the impact a

mine makes on the environment and surrounding community." Sustainability can often be viewed as a hurdle to profit or a short-term fix of something that requires long-term solutions. One of the big changes Jo has seen over the years is that new mining companies see themselves differently from the old-school "dig it all up and leave it" way of doing things. "Newer mining companies are much more on board with the broad mainstream definition of sustainability, where they're more interested in removing historical wastes or reprocessing old dumps, and not necessarily as focused on breaking ground because they see themselves as part of the sustainable energy revolution."

While mining has changed and is now more environmentally friendly, it is still short-term focused. Jo notes that in other parts of the water sector sustainability is taken much more seriously. "Some careers like hydrology, require precise measurements decades apart or their entire career revolves around four data points. Where the process is longer sometimes thousands or hundreds of years sustainability means something very different."

Career highlights

Her career is filled with highly respected roles, such as the research manager at

the Water Research Commission, and former director of WISA, and she is currently the head of the Trial Reservoir Global Services in the UK. She helped start Young Water Professionals UK and was a founding chairperson of the Young Water Professionals Southern Africa. She explains "I was a postdoc and my direct line manager at Cranfield University at the time, was setting it up, and he reeled me in to help him. And I thought this was fantastic. I wasn't in any of the photos at the first conference because I was the one taking the photos! When I moved to South Africa I was working at Rhodes University and the situation was so different. A lot of the abstract concepts I learned about were just a reality here and my first PhD student and her experience was so different from the British student I was used to teaching. She lived in the township outside of Grahamstown and she would have to fetch water for her household before arriving at the lab in the morning. We had very little library and digital access at that time, and I quickly realised that she didn't have that support

structure where we could bounce ideas between 20 people. The students I was working with had a real hunger for information that was difficult to access. So I started the Young Water Professionals of Southern Africa as a way to give these students a network of people for them to use,"

"At the time I was in contact with Prof Tobias Barnard who was based in Johannesburg. We decided the best way to go about setting this up was to make it look as if there was already something to join. So we begged for free and discounted facilities from the CSIR, which gave us their convention centre to host the first conference. We designed our own flyers. We spammed everybody by email, and we said "Please join the inaugural conference of the Young Water Professionals. Everyone who's anyone under 35 in the sector will be there." We got it endorsed by WISA and by the International Water Association.



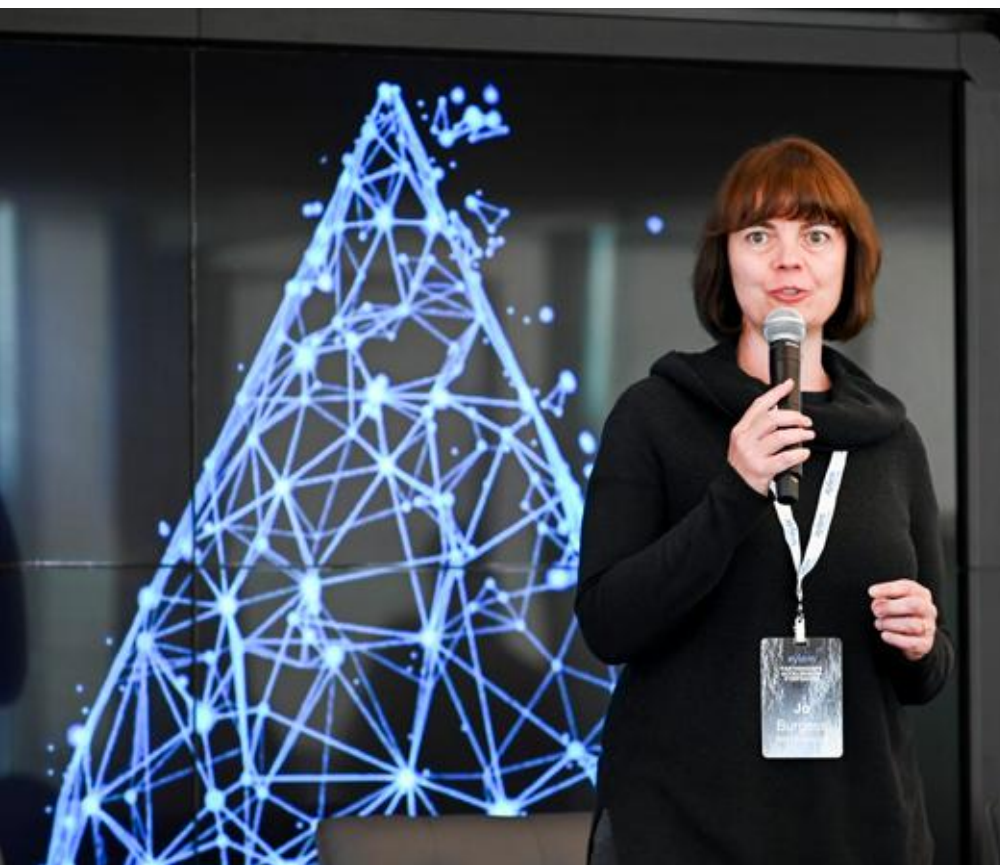
So it was a joint body, rather than having two that would compete with each other, please come. We thought we might get about 50 to 80

people and 150 people registered." She says this is her proudest moment, and she can't help but feel warm whenever she looks at the great work done by the Young Water Professionals.

From its humble beginnings, Young Water Professionals has grown and there are chapters popping up all across Africa. She says of this "I see that there are chapters in Rwanda and Uganda and the youth are really engaged. They want to halt pollution, they want to reverse degradation, they want to mitigate risks to the environment. And they're not just sitting there going, someone should do something. They know that they are someone and they're going to do something. And I think that it

On site at one of the Trial Reservoir tests in the UK





Prof Jo Burgess delivering a presentation at the IWA World Water Congress and Exhibition

gives me such hope. I think the younger generations are amazing."

Water in the South African context

Her proudest moment is a valued one when looking into her career highlights, she was recently awarded the WISA Honourary Member Award at the WISA2024 gala dinner. She says of this, "WISA is invaluable and being recognised by them is an honour." WISA is an organisation that pops up frequently in Prof Jo's career, from supporting the Young Water Professionals of Southern Africa to her director position at WISA. She says, "Every sector needs that one organisation that holds everything together, the glue. WISA is that for water." With its relatively small board, she notes that "WISA's mouth is big, its reach is large and it allows people from competing initiatives to stand on neutral ground and come together and work towards the bigger picture." She adds that WISA allows people to bring their expertise and work together in a way that facilitates systematic change.

South Africa's water sector is privileged in that there are many great organisations that support the great work done by the industry. Prof Jo says there are too many to name but says

"We have WISA and we have the Water Research Commission which is such a boost. South Africa is alone in that we have this one organisation dedicated to water research and is not tied up elsewhere, this is a phenomenal luxury." An example of this luxury at work is that South Africa produces three times more respected, peer-reviewed academic articles about water than any other field.

When asked about what makes the water sector in South Africa unique she

says, "Well the entire sector, globally, is filled with very passionate people yet in South Africa specifically, but Africa generally, there is a real fire. Somehow more passion and because they care about communities that don't have safe water, or they want to protect their natural environment. They care about pollution. Most people are here for the sake of something or someone that's not themselves, and it's a very warm, and very constructive."

Current work

Jo is currently the head of Trial Reservoirs at Isle Utilities. This organisation aims to mitigate financial risks to start-ups in the water sector. They effectively unlock the gate and grant access to great ideas that would otherwise be unable to function due to financial barriers.

Jo says, "Water is a sector that can't afford to lose great ideas so we provide funding to projects that show real promise. We finance projects with the guarantee that if successful they get a customer and if the project fails no one has to pay the loan back."

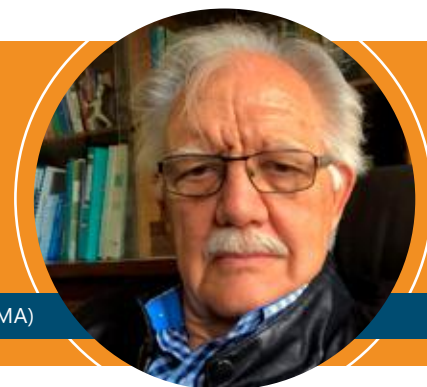
Her career path has taken her from asking for assistance in setting organisations up to being the one who helps others set up their projects. Lending a helping hand and expertise to the sector her work is invaluable. ●

Prepping the site for a Trial Reservoir Project in the UK



HDPE pipelines: a 100-year solution for South Africa's water infrastructure challenges

Jan Venter, CEO of the South African Plastic Pipe Manufacturers Association (SAPPMA)



Water losses, mostly caused by leaking or broken pipes and infrastructure, are untenably high in most South African cities. Part of the remedy is the repair and replacement of collapsing pipelines. **Kirsten Kelly** talks to Jan Venter, CEO of the South African Plastic Pipe Manufacturers Association (SAPPMA) about quality.

HDPE (high-density polyethylene) pipelines can have anywhere between a 50- and 100-year lifespan. In Europe, 100-year lifespans are becoming the norm. Quality HDPE pipelines are key to efficient, sustainable, and cost-effective water management," says Venter.

The purpose and mission of SAPPMA are to create absolute customer confidence in the plastics pipe industry, thereby ensuring long-term sustainability. To this end, SAPPMA is a voluntary, self-regulating, nonprofit association that represents approximately 80% of the plastic pipe manufacturers and other stakeholders in the Southern African market and is recognised by design

engineers and customers as the quality control gatekeeper.

Quality

"The polymers used to manufacture HDPE pipes are expensive and make up to 80% of pipe manufacturing costs. With the economic pressures experienced by pipe manufacturers, it may be tempting to use cheaper, recycled polymers. However, this is not allowed by international pipe standards as the use of recycled polymers may greatly reduce the service life of pipes and in many cases, failure can take place in months," explains Venter.

Therefore, maintaining quality is the very foundation of SAPPMA's existence. There is a strict code of conduct that must be signed by the CEO or every SAPPMA member. The association conducts frequent, unannounced audits at all its members' factories, ensuring all products meet relevant specifications.

SAPPMA also performs -regular sampling and testing of pipe samples, and intend to publish the results, thereby highlighting any company using inferior polymers. Members that contravene the code of conduct are

expelled. Locally, pipes that do not bear the SAPPMA mark carry no assurance of product quality.

"We are receiving an increased number of requests for SAPPMA certificates, indicating a positive move within the industry where tenders are requesting proof of quality," adds Venter.

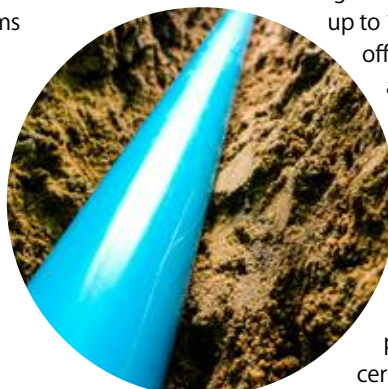
Verifying pipe quality

In addition to asking for SAPPMA certificates, consulting engineers or any client that is buying HDPE pipes can use a SAPPMA technical manual or phone SAPPMA to assist in verifying pipe quality. They should also ask for raw material certificates as well as an accreditation from a certification body.

The surface of pipes should be free from scratches and indentations as well as other imperfections. The outside diameter, wall thickness, ovality and length must be within the allowable pipe tolerances of the relevant pipe standard and should be uniform throughout.

"All tender documents should stipulate that only virgin polymers must be used in the manufacture of HDPE pipes and specify the very latest standards. Again, SAPPMA can give assistance in this regard and can also accompany a consulting engineer or client to inspect a factory," concludes Venter.

The adoption of high-quality HDPE pipelines presents a long-term solution to South Africa's water infrastructure challenges. With a potential lifespan of up to 100 years, these pipelines offer durability, cost-efficiency, and sustainability, helping to combat the country's ongoing water losses due to aging infrastructure. Fortunately, more tenders and clients are recognising the importance of using virgin polymers and SAPPMA certified products. ●



REVOLUTIONARY PIPELINE OVERHAUL TRANSFORMS CAPE TOWN'S CRITICAL INFRASTRUCTURE



The SWP winding cage and drive unit being prepared for deployment to the site



Schematic of the SWP process
Credit: SWP GmbH

Mainline Civil Engineering Contractors are transforming Cape Town's underground infrastructure through what has become South Africa's most ambitious sewer rehabilitation initiative to date.

Spearheaded by the City of Cape Town, the R796 million **Cape Flats Bulk Sewer Rehabilitation Project** kicked off in 2020. As a pioneer in pipeline construction with an international footprint, Mainline was chosen as a contractor on the project. Ingerop are the Employers Agent for the City of Cape Town as well as the consulting engineer for the project and their innovative, solutions focussed approach was critical in the success of this project according to Mainline.

On completion of the various works packages awarded to date, Mainline will have fully rehabilitated over 10 km of bulk sewer pipeline utilising the Spirally Wound Pipe System. Mainline has so far cleaned, profiled, and CCTV inspected over 16 km of pipeline. The project also includes rehabilitating more than 70 manholes, making it a thorough infrastructure renewal initiative.

The company's proven track record in delivering complex infrastructure solutions, while effectively problem-solving challenges that present themselves during intricate contracts stood the company in good stead during this massive undertaking.

Tackling a 60-year infrastructure crisis

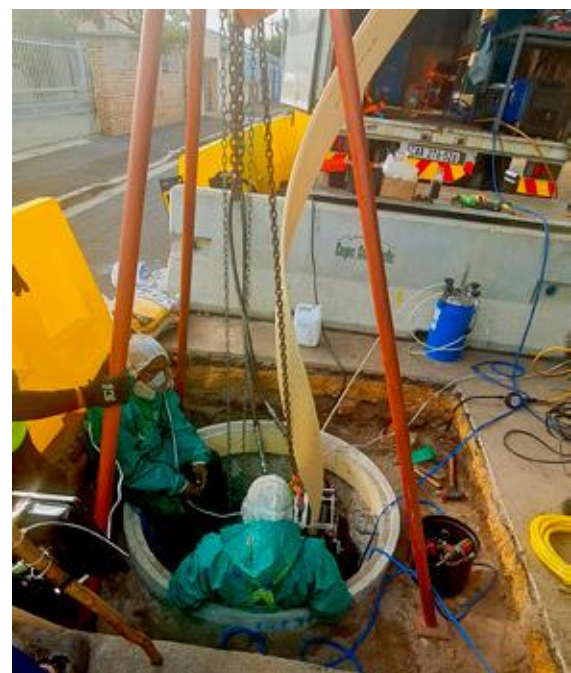
Serving as the lifeline for nearly one million residents across 300 000 households, the Cape Flats twin bulk sewers have supported the region's sanitation needs since their original construction in the 1960s. This massive network, spanning 8 000 hectares with pipes ranging from 1 000 mm to 1 800 mm in diameter, faced critical functional challenges, including extensive sediment accumulation, severe structural deterioration and hazardous groundwater

exfiltration from decades of continuous use. With population growth and housing density showing no signs of slowing down, the need for an overhaul was critical.

A project of this scale has substantial design considerations and on commencement, this intensified when initial plans to utilise the adjacent sewer line as a bypass during rehabilitation were challenged due to the significant build-up of sediment, debris and unexpected blockages. Traditional cleaning methods such as high-pressure jetting was insufficient, necessitating brave teams to head underground and undertake hazardous



The SWP winding cage and equipment being lowered into a manhole



Rehabilitation of an existing pipe utilising the trenchless construction method of SWP Liner - a typical construction setup through an existing manhole



Major overpumping was required to enable the works to proceed

confined-space operations spanning many months. Despite these obstacles, Mainline's engineering prowess and commitment to service delivery ensured uninterrupted service, managing an impressive flow rate of 84 000 litres per hour, 24-hours a day for the duration of the Works Packages.

Technology and skills transfer

Prior to the commencement of the contracts, Mainline engaged with other specialists in the field of trenchless rehabilitation, specifically in the disciplines of Spirally Wound Pipe (SWP) Liners, as the bulk of the pipeline rehabilitation would be undertaken utilising this technology.

Spirally wound pipe lining is a trenchless method of rehabilitating damaged or deteriorating pipelines, such as sewer or stormwater systems, using a spirally wound pipe liner. The Spiral Wound Pipe SWP Lining consists of a single, continuous strip of PVC, which is spirally wound into the existing pipeline via a high-tech winding machine positioned in the base of an existing manhole or access chamber. This process creates a single continuous PVC pipe in the existing host pipe.

As the liner is inserted, it is unrolled and spirally wound into place, conforming to the shape of the existing pipeline. When the flat profile is wound to the specified diameter and pipeline shape, it is simultaneously secured with a mechanical joint and a chemical weld, creating a durable liner that conforms to the existing pipeline. This results in a strong, smooth, and corrosion-resistant surface.

Spirally wound pipe lining offers a number of benefits over traditional pipeline repair methods, including reduced disruption to the surrounding area, faster installation times, and improved resistance to corrosion and

wear. It is also a cost-effective solution for rehabilitating damaged or deteriorating pipelines, as it eliminates the need for costly excavation and replacement. Additionally, spirally wound pipe liners can be customized to fit a wide range of pipeline sizes and shapes, making it a versatile solution for a variety of applications of the pipeline.

This was the first time SWP Liners would be utilised at scale in the country. Therefore, Mainline partnered with the German SWP specialists, SWP Systems GmbH, who assisted them with the design and supply of the specific SWP system to be used on the Cape Flats projects, as well as providing technical support and training, both in Germany and South Africa. Together with SWP Systems GmbH, Mainline procured and imported the specialist equipment and over 250 000 m of SWP liner profile to be utilised on the Cape Flats Bulk Sewer Rehabilitation. Additionally, all staff were trained on the use of the Amphitec Vacuum Excavators as well as confined space training. Mainline also trained staff as safety, health and environment representatives, first aiders and flagmen.

Transforming communities: from crisis to award winning success

The impact of the **Cape Flats Bulk Sewer Rehabilitation Project** extends far beyond infrastructure. Between 2020 and 2024, this initiative generated over one million man-days of employment opportunities for local skilled and unskilled labour. "The rehabilitation of the Cape Flats Bulk Sewer has had a huge impact on the surrounding communities, not only through the employment opportunities created, but with this comprehensive replacement of a severely deteriorated bulk sewer pipeline system – prior to the rehabilitation,

blockages and dangerous overflows were a common occurrence," notes Jared Smith, Mainline Contracts Manager for the project. The transformation is remarkable – previously blocked lines operating at just 20% capacity have been restored to full functionality, promising decades of reliable service and full capacity operation.

This flagship rehabilitation project, has also earned Mainline prestigious recognition, including the coveted Joop van Wamelen Award of Excellence, awarded by the Southern African Society of Trenchless Technology (SASTT). Additionally, the City of Cape Town has further demonstrated its commitment to maintaining this revitalised infrastructure by investing in a fleet of 23 specialised jetting trucks, ensuring the longevity of this crucial urban system.

"Mainline is an undoubted dominant player in South African pipeline rehabilitation and the successful completion of these impressive SWP projects within budget and on time amplifies our capabilities and commitment to remaining a pioneering service provider," concludes Smith. ●

Mainline is a specialist civil engineering contractor in the field of pipeline construction, the trenchless installation of underground pipelines and utilities, and trenchless pipeline rehabilitation and tunnelling in both the public and private sectors.



www.mainlinesa.co.za



Water pollution in South Africa has worsened due to the lack of maintenance in municipal infrastructure

A NEW DEFENDER EMERGES TO TACKLE WATER POLLUTION

The Department of Water and Sanitation’s (DWS) Deputy Minister – Isaac Sello Seitlholo – talks to **Kirsten Kelly** about proactive measures being implemented to address water pollution.

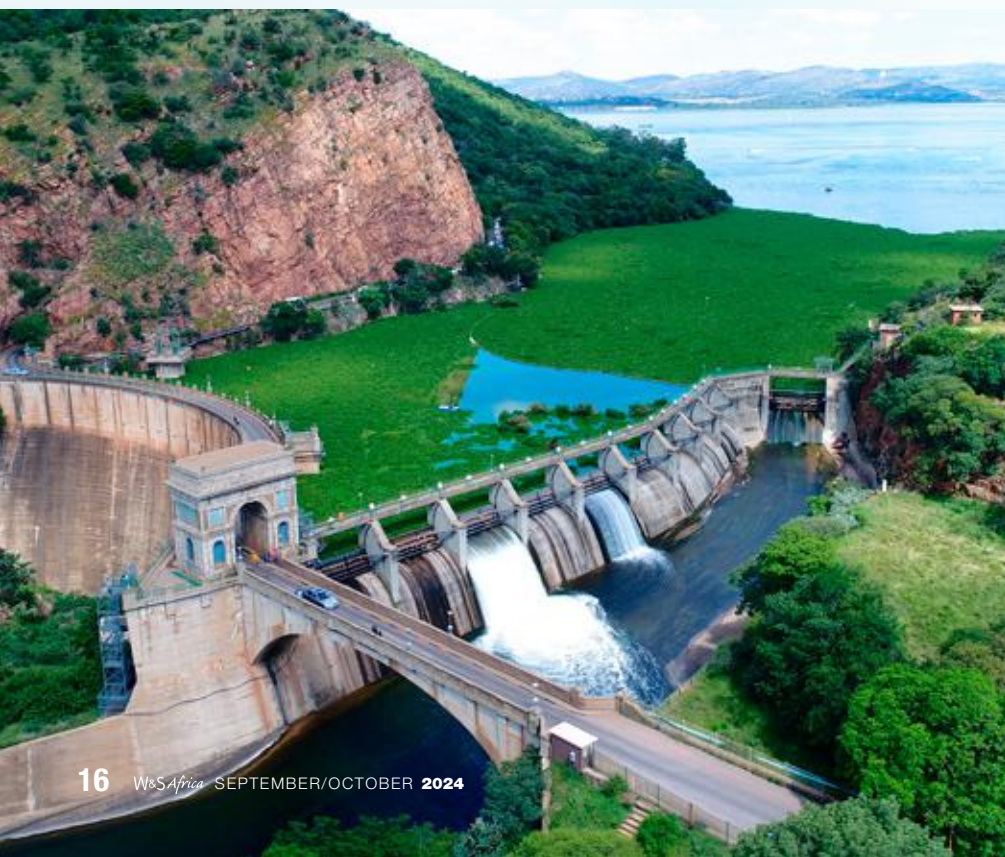
“**W**ater pollution in South Africa has worsened, and it has worsened largely due to the collapse of municipal governance. By not properly planning for, operating, maintaining or building water and sanitation infrastructure, raw

sewage is running down some streets in this country and our dams and rivers are being polluted by broken down wastewater treatment works. This had led to the proliferation of alien invasive plants such as the Water Lettuce in the Vaal River and the Hyacinth in Hartbeespoort Dam,” notes Seitlholo.

He adds that Water Service Providers (WSPs) have to abstract this polluted water and treat it to potable standards. “Water pollution has raised the cost of water treatment, and is a direct threat to water security, the economy, the livelihood of businesses and health of the public. Unfortunately, many of these failing municipalities do not have the means to turn this situation around in the short term. I do believe that the private sector as well as capable water boards are best placed to assist with dealing with the collapse of water and sanitation infrastructure.”

Deputy Minister Seitlholo has visited a number of municipalities over the past few months, a majority of which are in the Free State. He visited Springontein in Kopanong Local Municipality, where all nine of their wastewater treatment plants are either partially operational or not working at all. “Mafube Municipality received 0% in the Green Drop Report. Matjhabeng Municipality’s sewage woes are also well documented due to years of neglect. When I visit these municipalities, I hope to bring attention to the fact that they need to give up the running of their water and sanitation services to more capable entities. Corrective action plans hold no weight when it is clear that they are unable to implement those plans.”

Hartebeespoort Dam





Water pollution in South Africa has worsened, and it has worsened largely due to the collapse of municipal governance. By not properly planning for, operating, maintaining or building water and sanitation infrastructure, raw sewage is running down some streets in this country and our dams and rivers are being polluted by broken down wastewater treatment works. This had led to the proliferation of alien invasive plants such as the Water Lettuce in the Vaal River and the Hyacinth in Hartebeespoort Dam.”



The Department of Water and Sanitation's (DWS) Deputy Minister – Isaac Sello Seitlholo

Litigation

The DWS have issued directives to non-compliant municipalities for failure to take reasonable measures to prevent pollution of the water resources. Alarming, every single municipality in the Free-State has been either issued with a Section 19 Directive or notice from the Regulation, Compliance and Enforcement Branch. Criminal cases have been opened against 52 municipalities.

“Generally, when directives are sent to the private sector, companies usually react quickly to rectify their actions. Unfortunately, the biggest polluters (municipalities) are slow to react, if they react at all. It is extremely challenging to sue other organs of state. An inter-governmental process must be followed regarding civil and criminal litigation. This is because the Constitution states that organs of state must avoid legal proceedings against each other. Therefore, before instituting civil or criminal action against another organ of state, the DWS must exhaust all measures before going to court,” maintains Seitlholo.

“This process can take a few years, and during that period, municipalities could have allocated resources, used grants, ring fenced funding and taken corrective measures to deal with the breakdown of their infrastructure. But very often, they will wait until the court process is finalised. And a lot of money (that could have been directed elsewhere) is allocated towards legal fees,” he says.

“The DWS, Department of Cooperative Governance and Traditional Affairs (Cogta) and the South African Local Government Association (Salga) need to sit together and find a solution to failing municipalities that are threatening our water resources. Municipalities must appoint the correct people in the correct positions and ring-fence revenue for water and sanitation infrastructure.”

National Polluters Register

The Department is in the process of creating a database with the names of polluters in the country -the National

Polluters Register. The database will be utilised to keep a record of all polluters in the country as well as their transgressions and actions taken against them. It will assist the DWS to bring attention and pressure to polluters, with the hope that it brings change in their behaviour. The register will then be placed on the departmental website where members of the public will be able to access it.

“Currently, it is a working document, and the DWS is undergoing a process to make sure that the database would not open up the department to litigation. We want those in positions of authority, mayors and CEOs of companies to have their names put there in the register so that they account for the neglect that leaves our water polluted,” maintains Seitlholo.

In addition to the establishment of the National Polluters Register, the DWS will establish dedicated channels for stakeholders and the public to participate in reporting pollution, such as dedicated reporting desks; embark on a people-centred national

Water lettuce and water hyacinth



campaign on water anti-pollution; strengthen regulatory, compliance and enforcement capacity; and establish dedicated green investigative units and tribunals.

Vaal River Anti-Pollution Forum

Seithloho will be leading the anti-pollution drive across the country. Recently, the Vaal River Anti-Pollution Forum was launched to mitigate the years-long pollution impacting the Vaal river's water quality.

With the aim of protecting the Vaal River and providing high-level guidance, the Vaal River Anti-Pollution Forum will coordinate, improve and integrate efforts to manage the water quality of the Vaal River in line with determined resource quality objectives.

Members of the non-statutory forum include various stakeholders, particularly those directly affected by the declining water quality.

This will be done through addressing risks elevated by the 16 catchment management forums – ten in the Upper Vaal, four in the Middle Vaal and two in the Lower Vaal – which will continue to operate as normal but will escalate systemic challenges that cannot be resolved within these sub-catchments to the forum.

“The forum, through task teams, will also investigate and make recommendations on short-medium- and long-term actions that must be taken to improve the performance of the smaller forums and to elevate and effect any systematic actions in improving the water quality status in the Vaal, linked to the Catchment Management Strategy for Vaal Orange Catchment Management Agency and the larger national water quality strategy to synchronise role player actions,” says Seithloho.

The forum is also responsible for the coordination and support of awareness- building initiatives regarding water quality management in the Vaal River catchment; ensuring adequate stakeholder participation in the forum processes; and investigating and recommending innovative and best applicable technologies to deal with water pollution. The forum will identify remedial actions to mitigate the impact of contamination and pollution as a result of water use by sectors such as mines, industries, agriculture and wastewater works, besides others.

Members of the forum will also be responsible for enhancing collaboration with various institutions to improve

the quality of the Vaal River; providing support to the existing catchment forums in the Vaal River; and publishing reports on a yearly basis to track the performance and implementation of recommendations and activities of the forum.

“This is all about managing water resources at a ground level. We will have people engaging with communities and businesses. They will have first-hand information. It is also my hope that through the successes and lessons of the Forum, we may be able to replicate this work throughout the country. The government of national unity will be judged on its ability to grow the economy, and this will be impossible unless we start looking after our water resources,” states Seithloho.

He concludes that he is encouraged by the deep commitment that water professionals, businesses and non-profit institutions have towards providing a consistent supply of clean and safe water and sanitation. “I am supported by a strong team, at the age of 35 I have the passion and energy to tackle pollution. And the previous DWS Minister Senzo Mchunu has certainly done a lot of important groundwork that will give us the tools to turn this dire situation around.” ●

Vaal River



Umgeni River Mouth

TESTING THE WATERS

THE CRUCIAL ROLE OF WATER QUALITY MONITORING

Paddling used to be a favourite sport for Talbot CEO, Carl Haycock. But after experiencing raw sewage in the Umgeni River first hand, he put away his paddles and launched Talbot into action.

Talbot initially sponsored *E. coli* testing for the Umgeni River, Umdloti River and Msunduzi River, helping canoeists to make informed decisions on whether it's safe to use these rivers recreationally. A few years later, the company joined forces with Adopt a River to expand its water quality testing efforts, which now include testing Durban's Golden Mile and the Umhlanga beaches. In Gauteng, Talbot have also been sponsoring regular water quality testing for the Hennops River Revival in Tshwane.

These results, released weekly on Talbot's website and social media channels, are followed closely by community members and local businesses. Academics are also using the data for their research. "There was increased interest in our water quality monitoring tests after the 2022 Durban floods damaged the city's wastewater treatment and sanitation infrastructure,

resulting in high levels of *E. coli* in rivers and beaches. There is a strong correlation between extreme rainfall events and pollution in our rivers and seas," says Micole Martens, director, Talbot.

"We test for *E. coli* because it serves as a reliable indicator of faecal contamination in freshwater and marine environments. While Enterococci would provide a more accurate measure, it is a significantly more expensive test, making it an unsustainable option given that these tests are sponsored," she adds.

The samples are taken at predetermined sections of the rivers and beaches, that are recreational hotspots and are known problem areas of *E. coli* discharge. Samples are also taken at river mouths before they flow into the ocean.

Deteriorating water quality

Interestingly, Talbot's water quality test results have garnered attention from

professionals and companies around the world. Haycock notes that this is because deteriorating water quality in river systems is not exclusively a South African problem. "At the Paris Olympics, the first swimming event in the Seine River was postponed due to ongoing concerns about water pollution. In 2022, a House of Commons Committee report concluded that no river in England was free from chemical contamination."

Freshwater systems are one of the most threatened ecosystems on the planet. In almost every populated catchment, humans have to a greater or lesser degree increased the discharge of pollution. Wastewater quality affects the system directly, in the same way that pollution from mining, agriculture and other industries have a negative impact on the resource.

Haycock emphasizes that water quality monitoring is more widespread than the public generally perceives, extending



Micole Martens,
director, Talbot

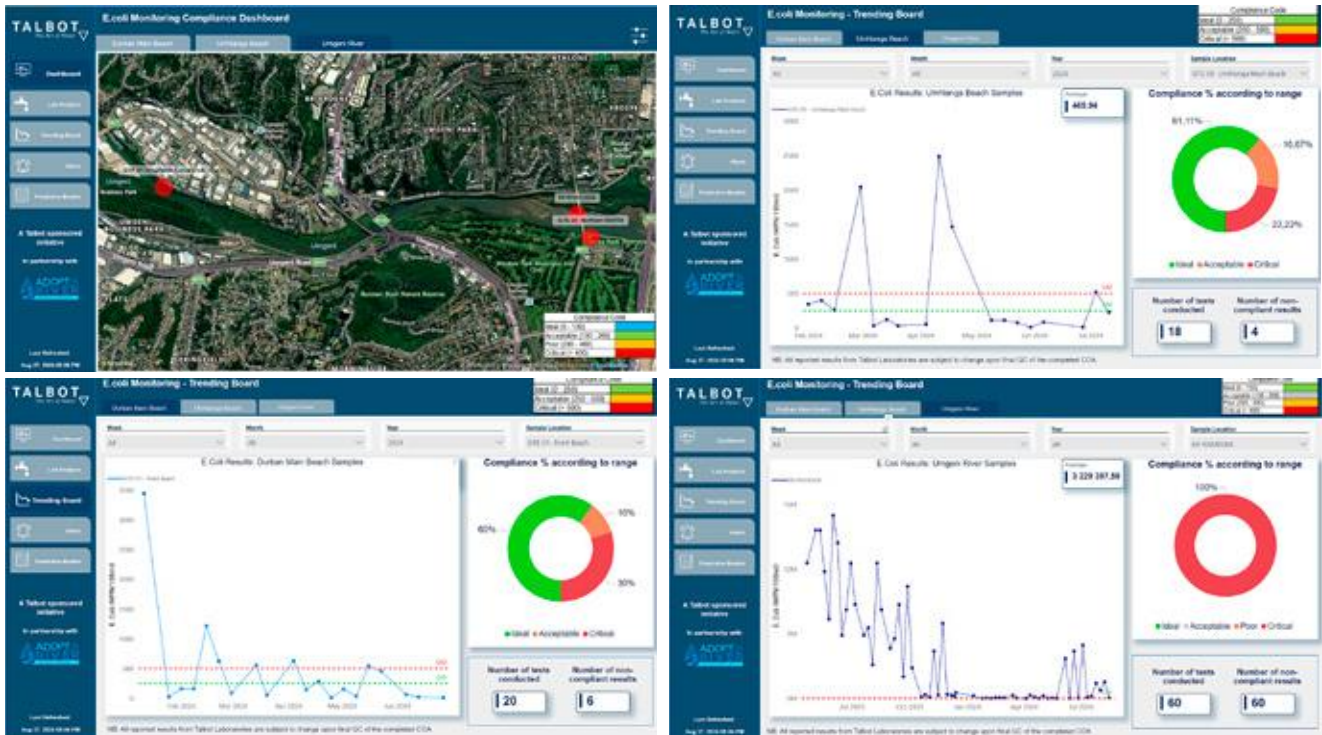


Carl Haycock,
CEO, Talbot



Boitumelo Matshediso, the business
unit manager of TalbotAnalytics

TalbotAnalytics empowers users to visualise and interpret their data as well as predict future trends



well beyond Talbot's highly publicised tests. "The government does a lot of water quality monitoring of their own. The Department of Water and Sanitation has national monitoring programmes that mostly monitor raw surface water quality in rivers and dams and produce long-term trend reports and visualisations. The eThekweni Municipality's Water and Sanitation Scientific Services take numerous samples from the rivers and beaches at different points monthly and test for a variety of parameters. The city has previously partnered with us

There is a strong correlation between extreme rainfall events and pollution in our rivers and seas

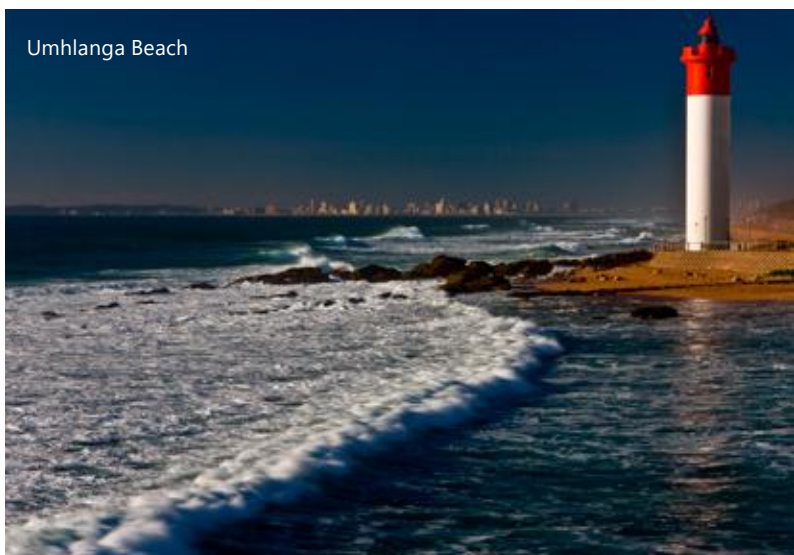
conduct joint readings that allow for a credible comparison of test results in the interests of transparency and public safety. During this exercise, the results produced were similar."

Talbot focuses on making their water quality tests accessible and understandable to the public. "It is important to educate the public on the water quality of rivers and beaches, but to also prompt more action in looking after and valuing our water resources and create general awareness around the sustainable use of water. These water quality results are a tool that can be used by the public to put pressure on whoever is causing a pollution event. The river and marine environment are being used

as a dumping ground for sewage and chemicals," explains Haycock.

Talbot Analytics

A stumbling block with water quality monitoring can be firstly taking samples and then interpreting data. Talbot, in partnership with Adopt a River have trained community members on how to take water samples at rivers and beaches. "Without training, the sample bottles may be unnecessarily contaminated, and the sample's integrity negatively affected. These community members are educated on the bottle types, places to take the samples as well as sample depth and the correct storage and transit of samples," states Martens.



Talbot then collects these samples at a central location and tests them at their SANAS-accredited laboratory.

Data collection and capturing require human intervention and this can lead to inaccuracies. But as Tabot's laboratory is SANAS accredited, they follow numerous quality tests. Once approved, the data is entered into a laboratory information system and is then pulled through to TalbotAnalytics.

A digital tool, TalbotAnalytics empowers users to visualise and interpret their data as well as predict future trends. According to Boitumelo Matshediso, the business unit manager of TalbotAnalytics, water quality data can be complex to interpret. "When entering the *E. Coli* test results into the software, we can display the findings in a simple format. You do not have to be a water scientist to be able to understand the outcomes of these test results." Matshediso has used TalbotAnalytics and predictive modelling to provide the community with festive season estimates of *E. Coli* levels at recreational hotspots.

"It is important to understand that both marine and freshwater systems are transient. Any sample that we take is representative of the concentration of the contaminant at that point in time at that location. If a sample is taken ten minutes later, results may differ. This is why it is incredibly important to analyse trends over a period. Are the tests at that location relatively consistent?" explains Haycock.

Over the past three years, Talbot have sponsored well over 1000 *E. Coli* tests, of which 46% have been non-compliant. Some of the results have shown astronomically high *E. Coli* levels, that is caused by raw sewage being pumped into the river system.

Private sector

Talbot's vision is 'Activating the transition to sustainable water'. "Water quality monitoring is a fundamental part of that journey. We can only make improvements once we know the water quality. From these test results, we can then assist clients in improving the water quality that is used in industrial processes as well as the water quality that is discharged back into the environment."

Matshediso states that while a lot of focus is understandably placed on the public sector, industrial companies also need to implement regular water quality monitoring to make sure that their effluent quality and volume complies with regulations. "Discharge tariffs and fines are escalating and can easily become a financial burden. Simply monitoring water consumption can be the first step in saving costs. Companies also need to be aware of the risk that water pollution poses to their business. Incoming water quality may not comply with SANS 241 everywhere, all of the time. It is important to understand the water quality within an industrial process. Poor quality water can negatively impact production processes and the cost of production."

A core focus for Talbot has always been reducing the risk that poor quality and unreliable water supply can bring to companies. "I do not believe that there are many industries that are fully optimised from a water perspective. We help companies use water more sustainably where they not only comply with regulation but mitigate their exposure to water risk. The less water used upstream and discharged downstream, the less exposure to risk," adds Haycock.

Talbot also inform their clients on what to expect in the future such as changing legislation, new technologies and emerging contaminants of concern. ●

TALBOT
The Art of Water

ACTIVATING THE TRANSITION TO SUSTAINABLE WATER

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SPECIALISTS
FOR 35 YEARS**
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YOUR WATER FUTURE**

**AI Data Driven Optimisation
Water Risk & Security Strategy
Feasibility Studies
Solution Development and Design
Turnkey Solutions
Water Management
Environmental Testing**



PROACTIVE MANAGEMENT OF WATER SYSTEMS IN THE WORKPLACE

Multiple provinces in the country are grappling with deteriorating water quality and increasingly frequent and lengthy disruptions to water supply. And as a workplace management solutions provider, Tsebo is tackling this reality head-on.

“**M**ost of our customers within the corporate and manufacturing environment are negatively affected by poor water quality and water disruptions. Without access to their own water sources, they struggle with maintaining work output, while keeping staff at work with basic operational hygiene standards. Furthermore, the lack of water poses serious fire safety risks as water is crucial for firefighting, with potential insurance consequences if it is unavailable. As an engineering and energy business, we have developed solutions to assist,” says Aubrey McElnea, CEO of Tsebo Facilities Management.

While Tsebo provides services like facilities management, cleaning, catering and security and more, the company is increasingly focusing on water management solutions. Businesses are realising that

expenditure on water solutions have a strong return of investment.

“Businesses need a backup water option, a buffer for when municipalities cannot guarantee supply. Generally, designing and installing water back-up solutions and implementing monitoring systems is a lot more complicated than setting up back up energy solutions,” adds Ebrahim Patel, head of engineering at Tsebo Facilities Solutions.

Water solutions

He says that a great deal of due diligence must go into implementing water back up and water monitoring systems. “For instance, in addition to determining the needs of the company, there is a civil engineering component to constructing a water storage solution. Various plans and approvals need to be made. It is also important to have a good overview of the water use in a business’s

operations. Very often, companies need less water back up than what they think if they just manage their available water a little better.”

There are seldom one size fits all water solutions. Businesses may occupy single-level buildings, multi-level buildings or multiple buildings in office parks. Some companies want water tanks above ground and other companies opt for an underground solution. The amount of backup water needed will vary from one company to another. While it is important to have backup water, the quality of the water needs to reach either potable standards or have a quality that can be used in a company’s production processes. “At Tsebo, we are a turnkey business and the utility part of the business can fully engineer a backup water solution; from calculating the quantity of water to be stored, the construction of the tanks, to specifying and installing the pumps, testing



Aubrey McElnea, CEO of
Tsebo Facilities Management



Ebrahim Patel, head of engineering
at Tsebo Facilities Solutions

and treating the water to applicable standards, consumption analytics, and even treating and recycling the sludge from water and wastewater treatment. Tsebo tackles business continuity and does not merely focus on hardware," states Patel.

Other companies want to reduce water usage by firstly monitoring the amount of water used, followed by identifying and targeting leaks. This is an iterative process where the solution is constantly tweaked based on new data obtained through smart meters.

Tsebo have their own real-time monitoring system that can calculate a number of parameters; from water inflow and outflow at various points, flow rates, water pressure, valve closures to pump and motor performances. "We can not only tell how much water is available in a client's water storage tank but can predict how long that water will last, based on historical data. Alarms can be set based on water pressure, tank levels or pump performance to the requisite people at the requisite management levels. This equips businesses to maintain their continuity, it decreases a business's reaction time and pinpoints the nature of a problem," notes Patel.

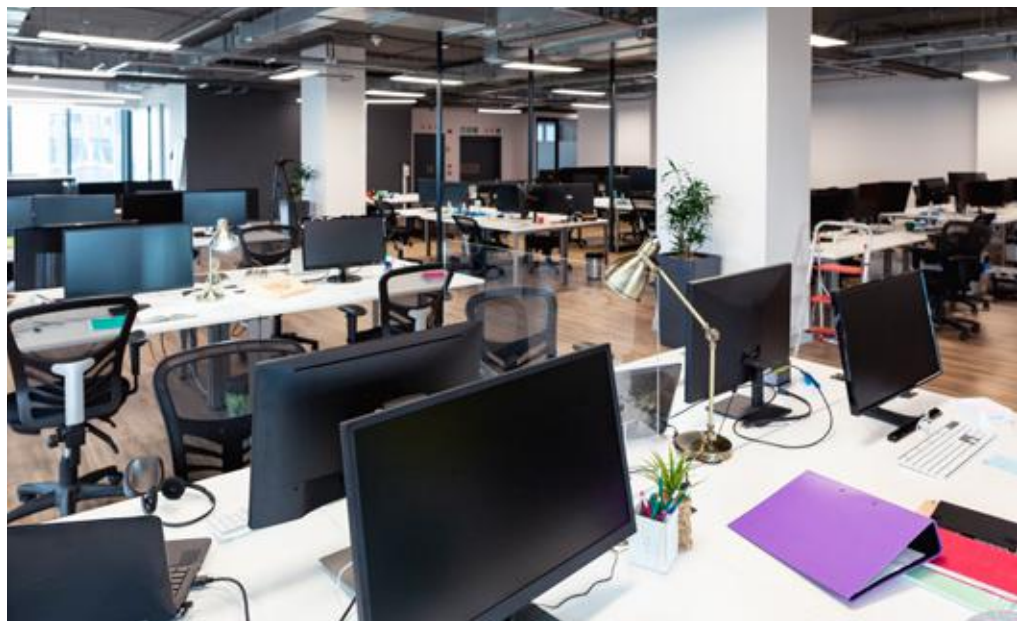
Water monitoring systems have been available for many years, but they have become more affordable to the average business. Monitoring can also be easily scaled and does not have to be costly. One issue with the installation of smart meters and other instrumentation is the risk of theft. "Tsebo has its own high-tech security company. It is relatively simple to

remotely monitor a device and create a security response to it. We have two national operating centres – one in Midrand and the other in Cape Town. Black screens are used, and only go live when unusual activity is detected," says McElnea.

Looking at the entire site holistically from a workplace management tool McElnea highlights investment in education and training around the importance of water conservation is as this important as investing in its physical infrastructure.

While most of Tsebo's clients are in the private sector, they have been involved with three successful public-private partnerships (PPP) where they construct and maintain infrastructure and then hand that infrastructure back

to the government after a number of years. "We were one of the first facilities management companies to be involved in a PPP. One of the PPPs we are involved in has been running for 23 years. It is all about directing private sector funding into public infrastructure. PPPs are a strategic model for pooling resources and expertise, accelerating the deployment of innovative solutions and ensuring sustainable management practices. In a country with scarce resources, we should harness skills and funding available in the private sector. We believe that a collaborative approach between the public and private sector is the only way that we can tackle the intermittent water supply and decline in water quality," concludes McElnea. ●





REDUCING RISK AND BUILDING TRUST

A world leader in testing, inspection and certification services, Bureau Veritas operates in agri-food, industry, commodities as well as building and infrastructure markets. Water is a critical resource across all these sectors, and as its quality declines, water analysis is becoming increasingly important.



Gavin Hefer, District Chief Executive for Bureau Veritas Southern Africa



Joanne Barton – managing director of M&L Laboratories, a Bureau Veritas facility

“From a Bureau Veritas perspective in Africa, a large component of our water analysis in terms of effluent and waste is done for the mining industry and large corporations. But the average consumer is also concerned about water quality. There are increased requests around testing the quality of borehole water and water in storage tanks. There is a general distrust when it comes to water quality in South Africa, which is not always justified as our metros generally have exceptional water quality. Regulations in South Africa are stringent and drive a lot of testing around water quality,” says Joanne Barton – managing director of M&L Laboratories, a Bureau Veritas facility.

To reduce water risk from a supply perspective, many companies and individuals are turning to groundwater. “This groundwater may be contaminated and require additional treatment before it can be used in production processes or before it can meet potable standards. It is also important to do a full spectrum of tests like microbiological analysis, metals analysis and an aggressiveness test,” she adds.

Bureau Veritas offers SANS 241 potable water testing, as well as environmental contaminated water analysis and soil testing, mining, effluents, agricultural, domestic, river and dam water testing. Waste classification and safety data sheets are also provided.

Laboratories

The company benefits from a large, global network of laboratories. Offering equipment and field-specific technical expertise, their facilities are strategically located, granting easier access from ports and major manufacturing locations.

“Laboratory equipment and technology is changing at a rapid pace. Instruments that used to fill a whole room can now sit on a benchtop. Laboratories need to invest in new equipment to get lower detection limits. There is a lot more flexibility and new ways in testing water where dirtier water samples can be tested without damaging the instruments,” maintains Barton.

This extends to the automation and the artificial intelligence where

laboratories use digital assistants to help technicians analyse data samples. Bureau Veritas has launched an AI program called CHARLES®, which is designed in partnership with Microsoft and its Azure platform,” states Barton.

AI improves laboratory testing in two major ways. First, it accelerates the testing process, analysing thousands of data points faster than the trained human eye. Since much of the data analysis performed in laboratory testing is repetitive and time-consuming, doling out simpler tasks to AI makes analysis quicker and easier. This allows lab technicians to focus on more sensitive testing issues - such as analysing abnormal or critical samples, those of greatest concern to clients - and thereby offer more useful insights and recommendations.

Secondly, AI has the power to learn as it works, recognising sample patterns more quickly and accurately over time - which is crucial for testing services. Because machine learning is not rule-based, but factors in correlations and permutations, it retains the flexibility to allow for various interpretations.

Barton adds that Bureau Veritas works with a variety of professionals in the water sector – from hydrogeologists, environmental consultants and chemists to engineers, financial consultants and mine managers. “A lot of the time, we do more than merely issue laboratory results. We identify trends, and issue reports through evaluating the water quality results. We essentially help our clients interpret their own data.”

Certifications

Furthermore, as an independent third party and accredited certification body, they can attest that management systems, services and people comply with specific standards. Depending on client needs and the regulatory framework, Bureau Veritas acts as an independent body, delivering reports and certificates required by third parties. As an independent certification body, Bureau Veritas certifies that the quality, health, safety and environment management systems utilised by clients comply with international standards (usually ISO norms) or with national, industry-wide segment or large company-specific standards.

All Bureau Veritas laboratories are SANAS 17025 accredited and are involved in accredited round robin testing schemes where different laboratories stringently monitor each other and evaluate if laboratories are proficient and upholding a high standard.

There are still a lot of water quality tests conducted through uncertificated laboratories. “Just because something is tested, does not mean that it is right. Inaccurate results have massive financial, environmental and even health implications, so it is absolutely vital that we not only comply but surpass testing standards. There is a growing trend where companies are more discerning on the laboratories they use,” states Gavin Hefer, District Chief Executive for Bureau Veritas Southern Africa.

Sustainability

Another trend is a greater focus on sustainability. “We help our clients to meet the challenges of safety, the environment, social responsibility and product or service quality all along the chain. With our expertise, our clients can measurably demonstrate the impact of their environmental, social and governance (ESG) actions by making them traceable, visible and reliable. By bringing transparency, we provide audit and certification services to protect clients’ brands and reputations. We support our clients in their selection of resources and during

production. Bureau Veritas strives to accompany all clients in delivering their sustainability strategy and meet the expectations of their employees and stakeholders. There is a greater push to accelerate the green and net-zero transition in Europe than in Africa. But there is growing interest in Africa, and this is where Bureau Veritas can add real value. Sustainability is at the core of everything we do,” says Hefer.

Bureau Veritas was established in 1828 and has a presence in over 140 countries around the world, with an impressive footprint in Africa. “While we have been operating in South Africa for 30 years through our Ormonde laboratory in Johannesburg and more recent Brackenfell laboratory in Cape Town, we opened our first branch in Senegal in 1898. Today, we employ over 3 500 people that work in 35 laboratories and offices in various countries on the continent. We are excited about our Cape Town laboratory, there is a definite need for testing services in the area, and we look forward to playing a key role in ensuring that water is safe to drink, discharge into the environment or use in production processes,” he adds.

Innovation, integrity, sustainability and international support both financially and technically set Bureau Veritas apart. They also focus on developing and nurturing skills of their employees as well as attracting the best possible talent in the industry. ●



CAN MUNICIPALITIES KEEP THE WATER FLOWING?



South Africa's growing urbanisation is straining the current water infrastructure, necessitating sustainable water. Having a reliable water supply is tied to social stability, and disruptions undermine community well-being as well as environmental sustainability.

Monitoring and managing pressure within water systems is vital to ensure consistent water delivery and to achieve sustainability goals. Pressure management aids in minimising resource waste, lowering consumption, and protecting infrastructure.

A stable supply is the minimum, sustainable water management goes beyond this and encompasses wastewater management and careful resource use. Water utilities recognise the operational and environmental benefits of precise pressure monitoring and reliable pressure sensors can prevent bursts, stop costly leakages, optimise water flow and ensure accurate readings that improve efficiency.

VEGA's systems

Standardising pressure instrumentation with VEGA's solutions simplifies the adoption of sustainable practices and provides facilities with a comprehensive approach to environmental management. VEGA's sensors are designed for durability and minimal resource demand, allowing treatment plants to streamline operations while reducing their environmental footprint.

Inaccurate and inconsistent data leads to inefficiencies, equipment wear, and higher maintenance costs, which ultimately strain environmental and financial resources. VEGA's pressure instrumentation equips water utilities and municipalities with reliable sensors that support efficient, resilient water management. The water pressure solutions that VEGA provides are cost-effective, and reliable and have been used globally for 40 years.

VEGA's pressure solutions, like the VEGABAR 38, allow utilities to remotely monitor tanks and chemical systems, conserving time and resources. With IO-Link communication, the VEGABAR 38 integrates smoothly into automated operations, offering an energy-efficient LED light ring and user-friendly VDMA menu that enhances usability while cutting operational costs and energy consumption.

For extreme environments, the VEGABAR 82 pressure transmitter features a resilient ceramic measuring cell designed to minimise maintenance needs. Ideal for challenging settings like sewerage and pipeline systems, the VEGABAR 82 supports continuous, efficient operation, reducing environmental strain through resource-conscious design. The VEGABAR

VEGA instruments offer reliable measurements in the most challenging environments

Series 80 sensors can be connected to provide electronic differential pressure measurements, expanding the possibilities for water and wastewater applications.

Precise influent and effluent flow measurement is essential, and the VEGADIF 85 differential pressure transmitter ensures accurate readings critical for effective flow management. Its overload diaphragm withstands pressure fluctuations, and its multivariable sensing capabilities provide precise data, supporting informed decision-making. This durability and precision make the VEGADIF 85 invaluable for consistent performance across various fluid measurement conditions.

The VEGAWELL 52, designed for hydrostatic level and pressure monitoring, offers a robust solution for continuous measurement in deep wells, reservoirs, and other challenging settings. Its durable construction and energy-efficient design make it a sustainable option that supports informed water management and resource allocation, ideal for both surface and subsurface applications.

The VEGA's app and Bluetooth monitoring allow facilities to remotely configure, manage, and troubleshoot, reducing the need for on-site intervention.

Adopting VEGA's pressure monitoring systems improves sustainability efforts by aligning operational efficiency with ecological preservation. ●



VEGA instruments offer reliable measurements in the most challenging environments

A collaboration between KSB Pumps and Valves (PTY) LTD, the Nama Koi Municipality, residents, and other private sector players aims to restore vital water supply to parts of the Nama Koi Municipality. This collaboration brings much-needed relief to the community.



Louis Harper of Springbok Municipality and Adriaan Augus of Nama Khoi Municipality inspect the Etanorm pump donated to the municipality

PUMP DONATION REVIVES NAMA KHOI WATER INFRASTRUCTURE

The condition of South Africa's water infrastructure suffers from its age, climate challenges, and budget constraints. The Nama Koi Municipality often struggled with water supply and faced even more challenges when trying to fix their pumps. Local manufacturer KSB Valves and Pumps, a major supplier of pumps and other water equipment, played a significant role in alleviating this problem by donating an Etanorm pump to the struggling municipality.

According to KSB Pumps and Valves' Upington branch manager, Andre Jonker, the donation was part of a collaborative project to restore the Overberg potable water pump station after a pump failure and other issues caused the station to nearly grind to a halt. The remaining pump had been struggling to operate at full capacity, leading to water shortages across the community.

The pump that saved the day

The Etanorm pump donated by KSB is their flagship. Renowned for its efficiency, reliability and ability to manage a wide range of applications including drinking water supply made it the perfect candidate for this project. This pump is designed for longevity while being energy-efficient. It has proven itself to be a versatile solution for municipalities across South Africa.

"The donation of the pump not only restored water services but also ensured a more durable and energy-efficient solution which will benefit the community for years to come. This joint effort highlights the power of collaboration between local businesses and municipal authorities. Several companies and experts joined forces with municipal experts to bring the pump station back online. It is an admirable achievement considering that all parties contributed their time, resources and expertise at no cost," says Andre.

Following the successful restoration of water services, Mayor Rodney Kritzingger expressed his heartfelt gratitude and acknowledged the joint efforts had saved the municipality a considerable amount.

"On behalf of the residents, the Nama Khoi Mayor would like to express his sincere thanks to all the role players who helped save almost R1 million by applying their expertise and businesses to get the Overberg pumping station up and running again."

The Mayor also extended special thanks to the following individuals and businesses:

- **Abri van Niekerk and Tiaan van den Heever of Novatec** for supplying and installing a new panel.
- **Thinus van Schalkwyk and his team from Copper 360** for repairing the pump's axles and supplying a new impeller.
- **Kobus Zandberg** for his organisational support.
- **Nico Moore of Springbok Motor Rewinds** for rebuilding critical components.
- **Andre Jonker, Martin Fourie and the Management team from KSB Pumps and Valves** for their donation of the KSB Etanorm pump, which was vital to the project.

Andre added that the restoration of the Nama Khoi pump station exemplifies how public-private partnerships can solve critical infrastructure challenges in South Africa. The stakeholders demonstrated leadership and commitment to the communities they serve. The initiative not only resolved an immediate crisis but also underscored the importance of long-term solutions to South Africa's water infrastructure needs. "We are proud that KSB Pumps and Valves continue to play a vital role in safeguarding South Africa's most precious resource – water." ●

Some of the participants in the Nama Khoi pump station projects include Louis Harper of Springbok Municipality, Adriaan Augus of Nama Khoi Municipality, Martin Fourie of KSB Mining, Mayor of Nama Khoi Municipality Rodney Kritzingger and KSB Upington branch manager, Andre Jonker



WATER CHALLENGES IN KZN DEMAND MORE RESILIENCE THROUGH COLLABORATION



The ageing water infrastructure and poor maintenance in KZN have led to ongoing water supply disruptions, which have been further exacerbated by recent extreme weather events and the 2022 riots

“We have seen more clients struggling with the reliability of their water supply and adequate water quality – factors that pose considerable risk to their businesses,” adds Hale. “These companies are responding individually as best they can, but many of these challenges are outside of their control. There is a genuine need to shift towards a more collaborative approach, which can build not only their corporate resilience but that of other stakeholders in their catchments.”

Industrial companies in KwaZulu-Natal (KZN) are finding it increasingly difficult to mitigate risks related to water supply and quality. Acting alone in trying to resolve these risks illustrates the shortcomings of non-collaboration and highlights the need for a collaborative approach to build water resilience.

KZN experiences water supply interruptions for a number of reasons, Tamaryn Hale, principal environmental scientist at SRK Consulting’s Durban practice says that “ageing infrastructure and poor maintenance may be the primary cause of water supply problems, but this has been exacerbated by the recent extreme weather events in the province as well as the recovery from the 2022 riots.”

Poor state of water systems

The Department of Water and Sanitation’s 2023 Blue Drop report showed that out of the 172 water supply systems in KZN, only 3 were Blue Drop certified, 34 were performing poorly, and 21 were in a critical state. This report is very useful in contextualising the water woes that industrial companies face in KZN.

In this context “Companies are pursuing borehole drilling, river abstraction, and rainwater harvesting to address water risks. However, while productive these processes are often complex and time-consuming and sometimes have uncertain outcomes. Moreover, the quality of groundwater is often not at the specification required, so costly purification processes are needed to treat the water before it can be used,” says Hale.

She points out that reducing water use certainly presents some opportunities in terms of better maintenance and staff education, but achieving real savings in water consumption usually meant process enhancements which demanded equipment retrofitting and other capital investments.



“The more sustainable answer to today’s water challenges can be found in the water stewardship approach, which considers not just a company’s on-site conditions but the broader catchment,” she says.



Tamaryn Hale, a principal environmental scientist at SRK’s Durban practice has specialised in water stewardship, environmental management, and environmental auditing and compliance

“Industries within a catchment will face similar challenges, so they need to see the bigger picture and strive for closer collaboration in the ways that they develop solutions.”

She acknowledges that this level of cooperation can be a daunting task, but the water sector has in fact developed the expertise and tools to pursue this route. For instance, the Alliance for Water Stewardship (AWS) – a global membership collaboration comprising businesses, NGOs and the public sector – has developed the

AWS International Water Stewardship Standard. “The AWS framework is a valuable and proven resource to identify the water risks businesses face, not only for their site but for the catchment in which their site is located,” she says. “From this foundation, they can set up a plan to address and mitigate the risks.”

The first step in the AWS certification process involves gathering data to understand shared water challenges and water risks, impacts and opportunities, she explained. This includes understanding relevant stakeholders and their water-related challenges, as well as each site’s

ability to create influence beyond its boundaries.

“The next step is for the partners in such an initiative to commit to action and begin the necessary planning – through the compilation of a Water Stewardship Plan,” she said. “Using the information gathered, they will establish the desired outcomes to address shared water challenges, and set out the practical actions to achieve the outcomes.”

Hale, who is a credentialed AWS specialist, highlighted that KZN businesses should draw inspiration from the country’s recent Rugby World Cup slogan – Stronger Together – as they find ways to build water resilience through closer cooperation. ●

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THE DAILY STRUGGLES OF KABONDO EAST, A CRY FOR WATER

Children in Kabondo East often resort to drinking from open, contaminated water sources, increasing the risk of waterborne diseases



In the East Ward of Kabondo village in Kenya, the scarcity of clean and safe drinking water is not merely a daily inconvenience, but a full-on crisis that robs the community of its future. **By Francis Ogola Ndonga,** director of Lifewater Community Kenya

While the non-access to water affects everyone, the burden is most heavily placed onto the shoulders of the women and girls of the community. Every morning, as the sun rises groups of young girls leave their homes before daybreak, setting off on a long, often unsafe journey to

find water. Carrying jerry cans, these girls walk for miles to the nearest water source, often an open well or a distant stream. The search for water consumes their entire morning, leaving them exhausted and late for school or, in many cases, unable to attend at all.



Francis Ogola Ndonga,
director of Lifewater
Community Kenya

Girls missing out on education
In Got-Rateng Primary School, a nearby primary school, absenteeism among girls has become an all-too-common occurrence.

Instead of sitting in classrooms, they spend countless hours trekking to distant wells, missing valuable school time. This daily chore not only affects their education but also their prospects for the future. "I want to be a nurse," says Mary, a 14-year-old girl from the area, "but most days, I'm too tired to focus in class because I've already walked for hours just to fetch water."

The impact is felt most strongly during the dry season when water sources dry up, forcing the community to dig deeper into dangerous wells or search farther afield. The school's head teacher notes, "Girls here often fall behind in their studies. They want to learn, but the demand to fetch water is relentless."

Health risks and accidents

The dangers of water scarcity in Kabondo East are not limited to missed school days. The poorly constructed wells and open water sources pose serious health risks. Many wells in the area are shallow, contaminated with bacteria and are uncovered contributing to the higher risk of spreading contaminations. Waterborne diseases such as cholera, typhoid, and dysentery are rampant. "We've lost too many lives to diseases that could have been prevented if only we had clean water," laments Joyce, a mother of five who has seen her children fall ill repeatedly due to unsafe drinking water.

There have also been serious accidents that haunt the community. Hand-dug wells, often used in desperation, collapse unexpectedly. In 2023, a young girl lost her life when she fell into a dilapidated well while fetching water. The tragedy sent shockwaves through Kabondo East but little was done to change the reality that many families face: using dangerous wells is often their only option.



For the women of Kabondo East, fetching water is a daily struggle that takes a toll on their bodies and their time. With no access to clean, nearby water, they are forced to walk long distances under the scorching sun, balancing heavy jerry cans on their heads. The task is backbreaking, leaving many women with chronic pain and long-term health issues.

And yet, they have no choice. Water is essential for cooking, cleaning and caring for their families. "I wake up every day at 5 a.m.," says Eunice, a 37-year-old mother, "and I walk for hours to fetch water. By

the time I return, I am too tired to do anything else, but there's always more work waiting."

Social and Economic Consequences

The absence of accessible water in Kabondo East not only limits the physical wellbeing of the community but also has a lasting economic impact. The time spent fetching water, several

hours each day, could be better used for income-generating activities. Women, who shoulder most of the water-fetching responsibilities, have limited opportunities to engage in economic ventures, start small businesses, or take part in community leadership roles. Water scarcity is robbing them of the chance of a better life.

Children and adults alike are hindered in their capacity to dream bigger, as they remain tethered to survival-based tasks. Girls who are absent from school often rely on early marriage, cutting their potential to achieve financial independence. With half the population prevented from participating in the economy the economic growth of the East Ward remains stunted,

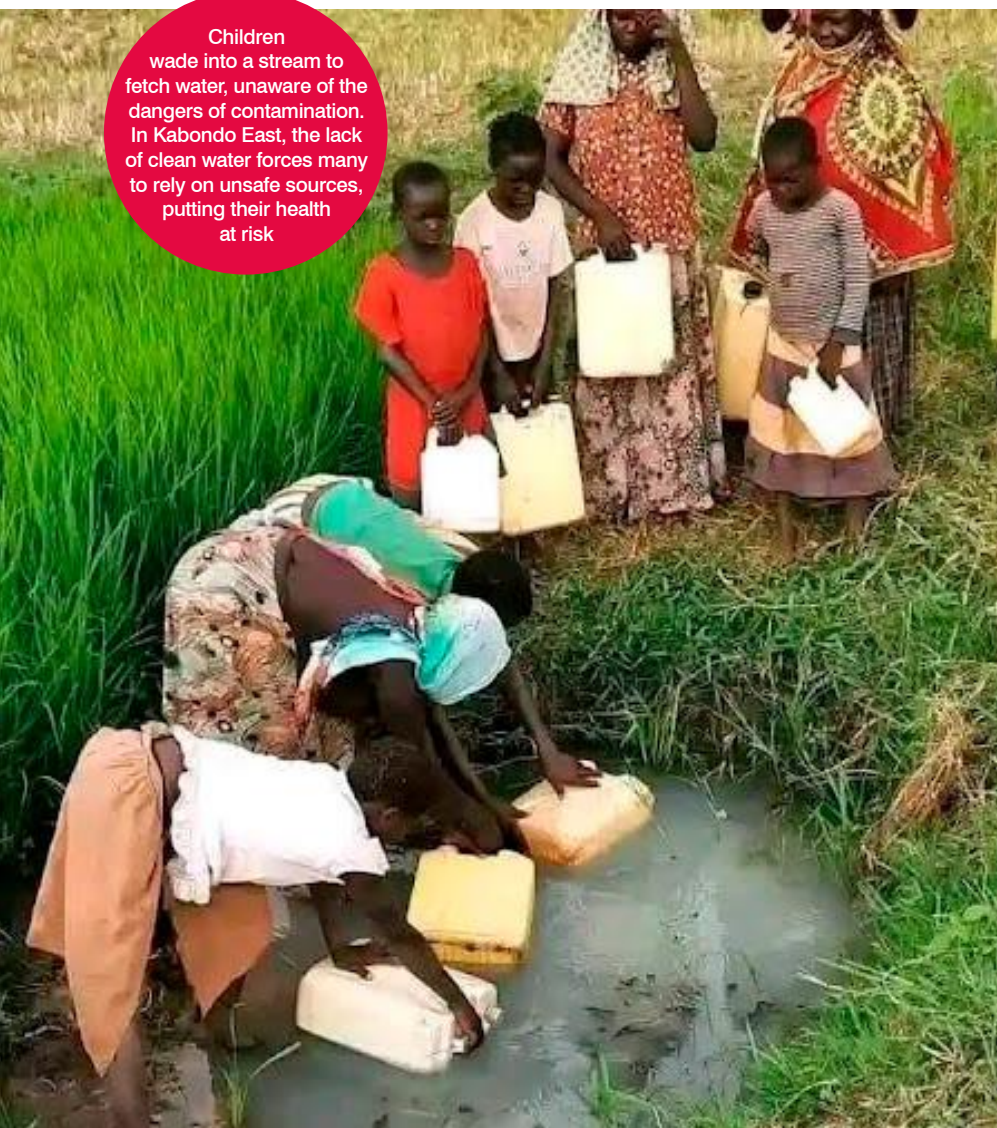
A Call for Change

The need for clean, reliable water in Kabondo East is beyond urgent. It's not just about convenience but it's about health, education and safety. The community needs wells that are properly constructed, deep enough to reach safe water tables and protected from contamination.

Without immediate intervention, the people of Kabondo East will continue to suffer the devastating consequences of water scarcity. The girls will keep missing school, women will continue to bear the brunt of the labour and more lives will be put at risk due to waterborne diseases and dangerous, collapsing wells.

Kabondo East is crying out for help. The construction of more wells, safer water sources and improved infrastructure is not just a necessity, it's a lifeline. The time to act is now, before another girl misses out on her education, before another family suffers from a preventable disease and before another life is tragically lost. ●

Children wade into a stream to fetch water, unaware of the dangers of contamination. In Kabondo East, the lack of clean water forces many to rely on unsafe sources, putting their health at risk



Municipal water debt: an existential crisis

Kraaibosch Dam

Municipal debt is an existential threat to the overall water security in South Africa. As of June 2024, municipal debts to water boards have reached R22.36 billion. This issue needs to be addressed to secure the future of water in South Africa. **By Duncan Nortier**

Minister of Water and Sanitation Pemmy Majodina notes that within the department's quarterly progress reports the issue of non-payment rears its head throughout. This non-payment has a knock-on effect that disrupts the entire water value chain. If water users don't pay, then municipalities can't pay, which means the water boards suffer, and this in turn affects the department's performance and goals.

How the sausage is made

South Africa has many spheres of government, each with its own level of independence and oversight. According to the constitution "A municipality has the right to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation, as provided

for in the Constitution." This means that a municipality has a certain level of independence so long as it achieves its mandates within the constitutional framework. The responsibilities of a municipality can be summed up as:

- Manage itself in order to provide the basic services it owes its constituents as per the constitution.
- Promote the social and economic development of the community the municipality serves.
- Participate in national and provincial development programmes.

As municipalities are by design meant to be self-sufficient they can generate income in two ways, collect revenue for the services rendered, fines, and property rates as well as through fiscal transfers from other spheres of government, often

referred to as grants and subsidies. This comes into conflict with South Africa's vast human rights protections. If water (a basic service that a municipality provides) is a guaranteed right, then fee collection from this service becomes a case-by-case instance. In a larger sense if the municipality must provide water, and it cannot or does not collect revenue from this rendering of service the municipality can not pay the Water Boards who provide them the potable water. These water boards as well as the municipality must continue to provide water but are now at a loss that leads to a fast accumulation of debt.

Far from an isolated case, municipal debt is an issue that threatens not only water. The historic non-payment of electricity exacerbated the existing energy crisis in South Africa leading to a near failure of electricity services and the fear is that if left unchecked the water sector could face greater risk.

Water boards are the hardest hit

The water boards are the hardest hit by this issue. Water boards are responsible for delivering potable water to the various municipalities that rely on them. These



institutions are invaluable to South Africa yet between 2019 and 2024 the debt owed to them has increased by 151%. This has left some water boards such as Vaal Central Water and Magalies Water in financial turmoil with the possibility of bankruptcy in 6 to 12 months. This leaves the Northern Cape, the Free State, and the North West in an extremely vulnerable position where the entire water value chain is at risk. Both of these water boards took over from Sedibeng Water as the entity was disestablished in 2022 due to bankruptcy, they are now facing a similar fate. "The magnitude of this problem is devastating to the cash flow of water boards and negatively affects the entire water value chain. Finding solutions to this unsustainable challenge is urgent and cannot be deferred any further," said Mr Leon Basson, the Chairperson of the Portfolio Committee on Water and Sanitation.

Without intervention, these water boards would have to cut back on essential spending such as vital maintenance, further reducing service quality and opening them up to more future risk. Pemmy Majodina says, "The National Treasury and DWS have collaborated on a standardised process for debt collection and credit control. This debt relief strategy is similar to the one implemented by Eskom. There is a caveat as this mechanism relies on municipalities to fulfil their payment obligation. Those unable to meet these obligations are excluded from this relief. Efforts are also underway to reprioritise budget allocations and explore alternative funding solutions, although available funds remain constrained."

"This issue cannot be solved alone, and we are relying on an inter-ministerial committee that seeks collaboration from multiple sources within government to aid in solving this problem," Pemmy says. This collaborative approach seeks to reform the ongoing billing issues, help with



revenue collection, and improve broader socio-economic goals such as combating the high levels of unemployment which affect payments in the first place.

Compounding issues

The department's challenges are deeply rooted in the country's socio-economic state.

As of Q2 2024, the country faces:

- 33.5% unemployment.
- 55.5% of the adult population are living below the upper-bound poverty line.
- Only 25.9 million South Africans are registered tax-payers.

This is the socio-economic backdrop that Minister Pemmy Majodina speaks of when she says, "The user-pay principle only works when the country is focused on growing the economy."

The user-pay (UPP) principle is the underlying methodology of basic service provision in South Africa, you pay for what you use, and this was adopted in the hopes of creating mindful consumption. However, the practice is far more

complicated. Both India and China, in a similar situation to South Africa, grapple with setting tariffs that generate income while balancing service distribution to the underprivileged. The UPP in South Africa creates pressure on those below the poverty line, while the economy offers little in the way of upward mobility.

The water sector still flows

The debt situation stands in contrast to the rest of the water sector, as the department carries on its mandate. Water, even with its debt baggage, must still flow. The sector cannot sit still in this crisis and the department has done important work in unblocking delays in existing projects including the Lesotho Highlands Water Project, the uMkhomazi, Ntabelanga, Stephen Dlamini and Foxwood dams and raising the Clanwilliam Dam wall.

The department's work has also included unblocking delays in the issuing of water use licences, which allows for more economic growth and opportunity as they are issued. These steps do show a committed department, in even the face of the debt crisis. ●



Water doesn't come out of thin air, investment and funding are integral to ensuring everyone has access to water.



WaterConnect: connecting people to water and funding to projects

Water is vital to life yet globally 2 billion people do not have access to safe drinking water or basic sanitation. This can only be described as a crisis, and its scale may feel overwhelming, but there are organisations that are working tirelessly to turn crisis into opportunity.

One of the key issues regarding water and sanitation projects is funding. Squaring 'water as a human right' versus 'infrastructure needs capital' is a theme that rears its head throughout the water crisis discourse. There are organisations such as Water.org, a non-profit that seeks to expand access to water and sanitation through leveraging funds that aims to address this issue head-on. The organisation sees water as a catalyst for economic growth, improving

communities and lives, and if funding is a hurdle their mission is help solve this. John Moyer, President of WaterConnect says, "Water.org has historically focused on catalysing investment at a household level. This has led to the construction of facilities like pipeline connections, toilets, sewer connections, septic tanks, and so on. But we know that we must also address gaps in financing at a city or municipal level; building septic tanks is an important step, but if there are no sludge treatment facilities those tanks won't realise their intended purpose."

Enter WaterConnect

This is the context in which WaterConnect exists. WaterConnect is a dedicated initiative of Water.org that is accelerating the volume and pace of investment in sustainable water infrastructure by supporting early-stage project development. "WaterConnect brings a new model to the same mission statement: provide access to clean water and sanitation for everyone, everywhere," adds John.

WaterConnect's model of partnering with the private sector mirrors Water.



John Moyer, President of WaterConnect

more investment when they are fully realised.

“What I see at WaterConnect is that investors have capital to finance the construction of water infrastructure in emerging markets, but there are not enough investable projects coming to market as a result of the gap in spending in project development. So the gap is self-sustaining, not enough goes into development, which results in less investable projects and inadequate investments,” says John before adding, “So the solution is actually simple on its face, bring more resources to the early stage.”

WaterConnect operates by partnering with co-developers and sharing project development costs during the project development process, and then as those projects reach financial close, WaterConnect will most likely exit and seek to recover its outlays so that those proceeds can be reinvested into additional projects and continue to catalyse increased impact.

Working in unison

Another pillar of the Water.org vision is WaterEquity, a stand-alone asset manager that invests in financial institutions, enterprises and projects in low and middle-income countries, particularly



focused on trying to deliver water and sanitation to communities vulnerable to the effects of climate change. WaterEquity, the asset manager, and WaterConnect, the project developer, share common impact objectives and can play complementary roles in financing water infrastructure.

“From recent trends, we can see that governments are adopting models that allow the private sector to contribute funding to public infrastructure projects. We hope to see further collaboration in the sector to produce more projects that ensure sustainable access to water and sanitation for everyone.” ●

org’s highly successful approach of working with private financial institutions to catalyse their water and sanitation lending. The organisation does not operate in isolation and complements co-developers to promote investment, John adds “This ensures that each piece of the puzzle, private and public, receives the necessary attention to promote change in the sector.”

The need for this funding mechanism is clear when the sector takes into account the challenges it faces. The World Bank estimates that the sector needs to expand its investment three-fold in order to meet Sustainable Development Goal 6,” says John Moyer, a sobering thought but an actionable one according to WaterConnect.

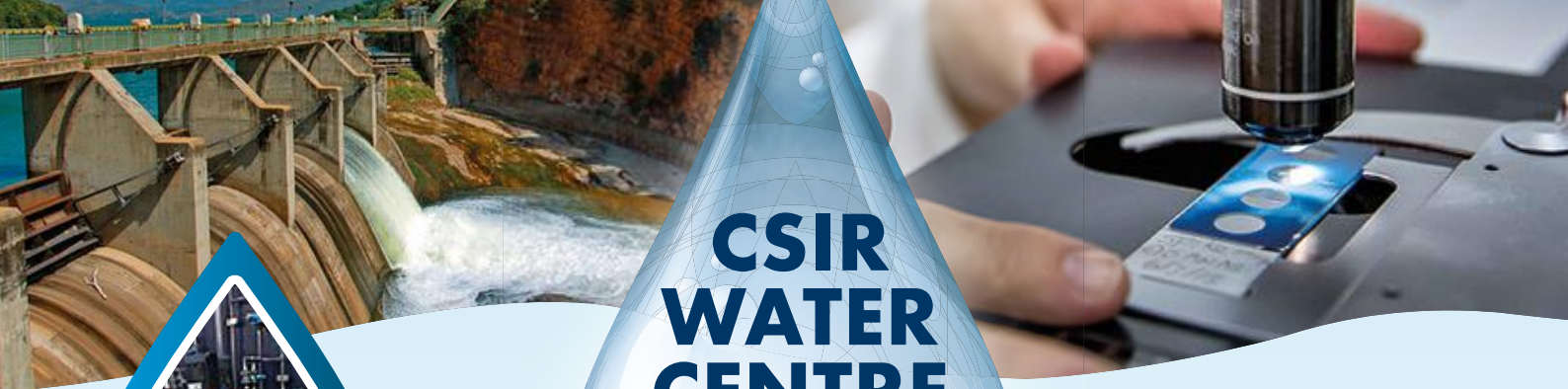
Leveraging funds to create investment-ready projects within the water space comes at the right time when climate change is affecting the world in unpredictable ways. “Projects need to be climate-proof. The increase in extreme weather events such as flooding and drought must be accounted for when developing infrastructure. We want to give everyone access to water and sanitation, but without climate-proofing that access could be short-lived” says John.

Funding creates investable opportunities

WaterConnect recognises that investors want fully realised projects to back. The usual risks associated with investing in the development stage are exacerbated in the water sector. Projects need to be carbon neutral, meet SDGs, and have their environmental impacts mitigated as starting points. This is the value that WaterConnect brings; by investing at the development stage, projects have the opportunity to flourish and receive

WaterConnect stems from Water.Org, founded by Matt Damon and Gary White.





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THE IMPORTANCE OF HYDROLOGICAL DECISION-SUPPORT SYSTEMS FOR SUSTAINABLE WATER MANAGEMENT



In today's world, with environmental concerns and a growing global population posing significant challenges, it is imperative that we prioritise the sustainable management of our precious water resources.

Hydrological decision-support systems are emerging as indispensable tools in our mission to safeguard this finite and invaluable resource. **By Harrison Pienaar, Research Group Leader: Smart Water Use, CSIR**

It is therefore important to shed more light on these critical components and their applications, given their significance in shaping a water-secure future.

At the heart of hydrological decision-support systems is a vast archive of surface and groundwater hydrology-related data. These archives serve as the basis for well-informed decisions. In this era, where there is constant reference to "data being the new oil," it becomes crucial to unlock all the insights concealed within these datasets adequately. By efficiently managing and utilising this trove of information resources, we can equip those in charge with essential knowledge to help them effectively navigate challenging water management dilemmas.

Analyses

One key aspect of hydrological decision-support systems is their ability to facilitate the analysis of water and land use planning. These tools provide invaluable assistance in

optimising practices for both land and water conservation, from precision agriculture to smart urban planning for development. The insights generated by these systems enable us to develop sustainable practices that strike a harmonious balance between human needs and environmental preservation.

In an era defined by big data, advanced analytics and techniques have revolutionised hydrology. The vast volume and complexity of hydrological data demand innovative solutions. By integrating big data analytics, hydrological decision-support systems offer a deeper understanding of hydrological processes, enabling more accurate predictions and effective management practices.

Integrated solutions

Effective water management goes beyond isolated measures; it necessitates a catchment-wide perspective. Hydrological decision-support systems facilitate the conjunctive use of surface and groundwater, as well as managed

aquifer recharge and rainwater harvesting. By promoting integrated solutions, these systems help maximise water availability while minimising waste and harmful environmental impacts.

Hydrological and hydrogeological monitoring networks, advanced decision-support tools and modelling capabilities are essential for understanding and managing our water resources. These require interoperable systems and processes coupled with relevant expertise to provide real-time insights into water availability, quality and movement. By harnessing the power of technology, we can respond swiftly to changing conditions while mitigating potential crises.

An essential aspect of effective water resource management entails measuring, collecting and analysing relevant parameters. Accurate information about the amount and quality of water is crucial for making informed decisions. Furthermore, creating databases that reflect various applications' crop coefficients and water usage increases our ability to manage these resources efficiently.

Hydrological decision-support systems are beacons of hope in the face of escalating water challenges. By embracing these systems, we equip ourselves with the knowledge, tools and insights necessary to navigate the complex terrain of water resource management. We must work together towards a water-secure future - one in which water is cherished, preserved and sustainably managed for generations to come. ●

Leaks and losses are inevitable in any water system, but in South Africa, they are a R28 billion problem that threatens the financial stability of the entire sector.



How technology can help with water issues in South Africa

The scope of South Africa's NRW has become a sticking point for the sector generating much private-sector interest, especially in the case of applying new technology as a solution. Xylem, an industry leader in smart water technology, hosted a webinar to discuss how technology can be used to fight against systematic water issues.

NRW is billed at bulk price, so the losses represent a potential asset if managed. The journey from loss to asset starts with the adoption of technology. Vinesan Govender, engineering manager at

Xylem says, "The explosion of being able to actually use data underlines a fundamental necessity to bring South Africa into the fourth industrial revolution," speaking to the moment. He further goes on to say, "We have these fantastic tools in South Africa, the Blue Drop, Green Drop, No Drop, and these are essentially reports that collate data. Now we have the tools to monitor in real-time, accessing even more data, and where previously this vast amount of data would sit, we can now analyse it, make decisions, improving efficiency can be fast-tracked."

Historically new technology is met with scepticism, but Silver Phiri from Seapro says, "The boots on the ground are genuinely excited by new tech that helps make their job easier. There has been a lot of buzz about digital twins for example, which make monitoring easier, and water professionals are keen on that."

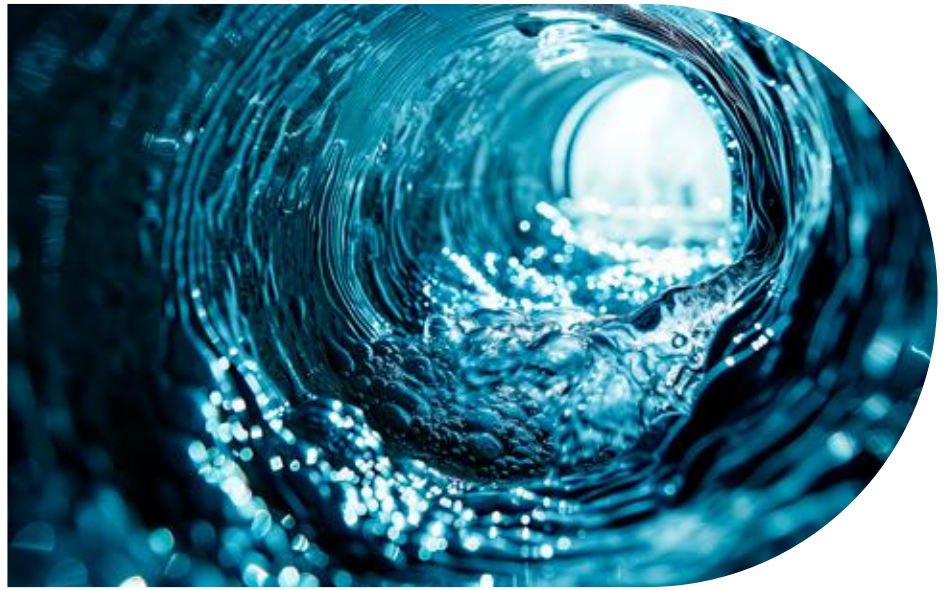
Govender says, "While the situation in South Africa of deteriorating infrastructure may seem gloomy, it is not alone. Using technology and borrowing knowledge from other successes shows

us a way forward." Reuben Marowa, sales director for East and North Africa at Xylem, adds, "The situation in South Africa is not unique but it provides a unique situation to move forward. We are already seeing the use of AI, the Internet of Things, and smart solutions, being taken up to make better decisions and concise improvements."

All of these efficiencies act as proof that the water sector thrives on collaboration, especially between the public and private sectors. "Financial stability in the sector will catalyse more investment," adds Marowa.

Vinesan Govender,
engineering
manager at Xylem

Reuben Marowa, sales
director for East and
North Africa at Xylem



Hitting walls, and climbing over them

While this rapid expansion of tech, and the easier adoption of it are near-utopian on paper there are significant hurdles to the adoption and use of technology, even if it is 'life-saving'. Phiri says, "The actual workers on the ground level are keen for technology but the decisions don't usually lie with them. Higher levels that give approval are the ones slower to adopt," highlighting an interesting reversal where the workers were once anxious about new tech imposed by their management. The usual suspects are also at play, from budget constraints to a lack of autonomy by utility managers. There is also the concern of long project times, from approval to procurement, that undermine the solutions that tech can bring. Phiri comments, "We see it all across the continent, the desperate need to maintain what we have puts improving and building in the back seat."

While the rapid expansion of technology and the willingness to adopt it are present, there are hurdles to these solutions. Phiri says that, "The actual workers on the ground level are keen for technology but the decisions don't usually lie with them. Higher levels that give approval are the ones slower to adopt." The usual suspects are also at play, from budget constraints to a lack of autonomy by utility managers. There is also the concern of long project times, from approval to procurement, that undermine the solutions that tech can bring. Phiri comments, "We see it all across the continent, the desperate need

to maintain what we have puts improving and building in the back seat."

Technology can also be taken as a hurdle itself, where it can be perceived as the catch-all solution rather than a tool. Technology is only an effective solution if used properly in line with other best practices.

All the panellists, Phiri, Govender, and Marowa agree that one of the main hurdles is a skills gap. "It makes no sense to add technology into a system where the ones who work with it are lacking the necessary training," says Govender. This notion is also data-backed, as the key performance metric that points to a functioning water system, is having skilled staff, according to the Blue Drop 2023 report.

Another concern is the "poor supplier-to-end user relationship," adds Phiri. From this understanding, Morawa adds,

"Xylem prioritises training and building relationships to ensure that the tech works as intended. Using technology as a solution only works when there is a strong relationship between the supplier and the end user."

Water at the end of the tunnel

Technology aids in finding new solutions to old problems. "Every utility or system needs to look at themselves, identify their own problems, establish a baseline, and only from here they can move forward," says Govender. Whether this is due to leakage, skills, or other problems, technology can persist in improving South Africa's water. Govender adds, "Technology along with the data, can help us go from reactive to 'proactive'. Moving us from rushing to fix things to preventative measures that benefit the overall health of the system." ●



Leaks, big or small, have a profound impact on a water system

DIGITAL TOOLS FOR WATER LOSSES

To combat non-revenue water and leakages the Water Research Commission launched its Water Loss and Reduction Tools, these tools are based on evidence and data and speak to a real need of addressing leaks within the South African water system.

The facts are that in South Africa nearly 50% of our total water output is non-revenue or lost. The sheer scale of water loss means that there is an increased delay in responding to water losses which creates a vicious cycle of losing water and being unable to stop the losses. These delays necessitate real-time responses which

can be achieved by utilising AI machine learning. Detecting patterns within large data sets can reveal surprising information that people may not be able to see.

One of the best markers of water usage is the litre per capita, which is used to assess both the access to water as well as water consumption. According to the World Health Organisation, the basic and

necessary water use per capita is 50-100 litres per person per day. This is the benchmark for water as a human right and not a prescribed limit, the averages per country vary but South Africa sits at a very high 266 litres per capita per day. This is alarming considering we are a water-scarce country, but more presciently this number includes the water losses of the country. According to the most recent data South Africa's water system suffers a 50% loss of water: water that is unbilled but paid for. This speaks to the urgent need for robust leak-detection software. Jay Bhagwan, executive manager of water use and waste management for the WRC, says, "Leaks represent a threat to the entire system when we consider the astronomical losses we face. Stopping unnecessary non-revenue water starts with leak detection and prevention."

The WRC responds to a need

The need for better leakage monitoring and solutions is clear, the WRC has responded to this need by updating its models, providing tools and training, and utilising digital opportunities which are all available on the new WRC's non-revenue water portal.

The WRC have a number of different software solutions available for the water sector. In the case of leak detection and prevention, there are four programmes that the WRC have



The NRW portal homepage



Jayant (Jay) Bhagwan, the Executive Manager of the key strategic area of Water Use and Waste Management at the South African Water Research Commission

that are used for effective leakage control. Each programme is based on the internationally accepted Burst and Background Estimates (BABE).

- **Sanflow**- is the programme that measures minimum night flows. This is a vital part of leak detection, especially in background and household leaks.
- **Premasc**- This is a pressure management programme that acts as a short-term solution to leaks. Lower pressure means less leakage and pressure management is a huge player in mitigating the problems of background leaks while bigger and longer-term solutions are being created.
- **Econoleak**- designs active leakage control, which is a long-term solution

and the end goal of detecting and monitoring leakages.

- **Benchleak**- A brand new programme of water auditing, This programme allows for benchmarking across multiple zones including personal, regional and national. The WRC also has an NRW scorecard that shows where WSA's sit within the system to help them compare and manage their own leak control strategies.

A new portal opens the path

In keeping with the WRC's commitment to digital and fourth industrial revolution approaches to water, they have launched the South African Non-Revenue Water Management Portal (SANRWP) which is according to Jay, "a one-stop shop for municipalities and other practitioners looking for guidance on managing NRW." The portal packages the existing advisory packages, solutions, guidelines, reports, innovations, technologies, and emerging technologies related to NRW into one platform.

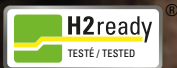
This portal highlights the move toward digital, even in 'traditional sectors'. The portal offers some unique opportunities in the face of the barriers the sector experiences such as:

- Predictive maintenance
- Data integration
- Encourage public participation
- Using data for a wide range of solutions (expanding the use of data)
- Data-backed and enhanced decision making
- Better feedback
- Future-proofing

This move to digital coincides with the WRC and DWS urging the use of smart water solutions which can:

- Reduce per capita consumption by up to 10%
- Reduce leakages by 20%
- Reduced billing
- Diminished costs in maintenance, repairs and energy
- Manage pressure and consumption
- Predict potential failures. ●

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CASH REGISTERS FOR MUNICIPALITIES: understanding water meters

The cost of a water meter is minimal compared to the overall expense of a water reticulation system (pipelines, valves, labour, and construction). Yet, it's the only component that generates revenue for water boards and municipalities, making it perplexing that cost is often prioritised over quality. **By Kirsten Kelly**

“Previously, engineers normally made all purchasing decisions, and meters were specified on quality and whether it is fit for purpose. But we are now seeing instances where a purchasing department is only interested in the number of water meters that can be bought for a stipulated sum of money,” says Stefan Bisschoff, national sales manager, CraigCor Distribution.

He notes that there are a lot of cheap imports that are entering the country

that look identical to other, quality water meters on the outside. “This is because there is a 40% to 70% local content rule for meters and to achieve this, they usually use a locally manufactured meter box. But there are massive variances internally. There is a difference between repeatability

Jacques-Louis van der Linde, senior account manager, Honeywell



and accuracy. While the cheap imports may comply with specifications before they are installed, they seldom comply with the same specification a year later. The data from meters is only as accurate as the meter itself. A good quality meter, even though its more expensive than cheaper imports, can quickly garner a return on investment due to its accuracy.”

Jacques-Louis van der Linde, senior account manager, Honeywell adds that fortunately, South Africa has the South African Metering Association as well as SABS standards that keep

local manufacturers accountable and mostly protects the country from using cheap imports that take inaccurate readings and have very short life spans. “The National Regulator for



Compulsory Specifications (NRCS) approves all manufacturing facilities. Meter test benches must be certified and recalibrated every year. Only approved certified verification officers can test meters."

Unfortunately, there are instances where parties will pay for the cheapest possible meters as they are not directly affected by the cost of inaccurate billing or meter replacements.

Classification

No single type of water meter fits all situations because factors like water flow rate, pipe size, installation environment, and required accuracy all vary across different applications. CraigCor Distribution partners with Honeywell, a technology and manufacturing leader, to provide clients with a complete metering solution. Honeywell offers water meters for both the residential as well as commercial and industrial sector.

Within the residential division on the mechanical side they offer multi-jet, single-jet, piston and volumetric meters. Then there are smart meters that are essentially electronic meters which can be either ultrasonic meters or magnetic flow meters. To add further

complexity, some of these meters are used for billing purposes while other meters are used for information.

"The terminology used when describing meters can cause confusion. For instance, one person will qualify a smart meter as an instrument with no moving parts, another person will believe that smart meters can have a mechanical mechanism with electronic dials, others believe it's a mechanical meter with an electronic output for remote monitoring. When helping a customer choose the right meter, it's important to understand exactly what the customer wants to achieve or what problem is the customer trying to solve. If a client battles to get access to properties and needs to take readings remotely, then a smart meter is a great solution. If there is a problem with revenue collection, then prepaid meters should be used," explains van der Linde.

Water meters are often classified by different grades or classes based on their accuracy, performance, and intended application. These grades indicate the precision of the meter under various flow conditions, typically defined by international



standards known as ISO (International Organisation for Standardisation). There are the main types of water meter grades:

- Class A Meters: These are the least accurate meters, generally used in situations where high precision is not necessary. They perform adequately in measuring higher flow rates but may struggle with accuracy at low flow rates.
- Class B Meters: More common in residential applications, Class B meters offer better accuracy than Class A, especially in medium to high flow rates. They are suitable



for households with moderate water usage.

- Class C Meters: These are highly accurate meters, particularly at low flow rates, and are commonly used in commercial and industrial applications. They ensure precise measurements even when water flows are minimal, making them ideal for situations where detailed monitoring is essential.
- Class D Meters: The most accurate of all, Class D meters are used in specialised applications where extremely precise measurements are required, even under low flow conditions. They are often used in environments where accurate billing or conservation is crucial.

“For instance, an irrigation meter is usually a Class A meter. It will give a very good sense of the quantities of water that is pumped out of dams, rivers and reservoirs. But for billing purposes one can only use Class B, Class C and Class D meters. The majority of meters are classified as Class B, and it’s the minimum standard in the Trade Metrology Act that can be used for billing. Honeywell would like to see the minimum



requirement raised to Class C accuracy because a lot of water is escaping measurement on the low flow,” says van der Linde.

The importance of volumetric meters

He states that multi-jet meters are widely used in South Africa and are in most cases, Class B meters. “They have an impeller that spins on a needle, making weight distribution quite sensitive. As soon as you change the orientation of the meter, you compromise on its accuracy as the needle has more friction. It can only be stored and placed in a horizontal position. Furthermore, the jets may get blocked by impurities in the water.”

While there is an understandable focus on water losses due to failing infrastructure, meters also take strain. Burst pipes can be the cause of sand and dirt being pushed through meters, as well as huge spikes in pressure, making multi-jet meters malfunction. Often municipal systems have faulty or non-existent air valves, which result in air pass through meters and causing them to over rev and even cease.

“Even though there is an increased adoption of ultrasonic meters (mostly by the private sector) as the price of the technology



declines, Honeywell favours volumetric meters for South Africa because of the value they provide. Firstly, they can be installed at any orientation, reducing any installation errors. They also have a built-in strainer that can filter out impurities and a reasonable amount of sand and grit can pass through its pistons,” explains van der Linde.

Support local businesses

Due to the high standards that local meter manufacturers must adhere to; it should be a foregone conclusion that South African companies can supply the best water metering solution.

“Honeywell were pioneers with both the brass based and polymer-based meters. Our meters are designed and developed for South African water conditions. Remember that imports are not designed for the lime scale, grit and sand found locally. Honeywell’s first water meter was installed at Cape Town Waterworks Department in 1901, we are not a fly by night operation,” says van der Linde.

To avoid theft, polymer-based water meters are recommended. Honeywell water meters are manufactured with UV stabilisers and a polymer that is more resistant to cracks than the other polymers on the market. All meters are also supplied with a protective cover that can double as a lockable box, reducing any potential tampering. The prepaid meters are fitted with a tamper proof device where a valve automatically shuts down once the meter lid is lifted. All Honeywell water meters undergo a series of quality, accuracy and pressure tests.

“CraigCor Distribution is the intermediate between big Original Equipment Manufacturers (OEM) and the local market. We are here to guide our customers, giving them the best possible value for money. By partnering with local manufacturers that manufacture top quality products like Honeywell, our customers receive the best possible support in terms of maintenance and technical advice. We are all about customer service and engagement and work closely with consulting engineers to make sure that the right meters are used with different water systems. CraigCor Distribution also has a massive stock holding,” states Bisschoff. ●

WATER INFRASTRUCTURE SIZING: insights from engineers

South Africa requires about R90 billion per year for the next decade to close the water infrastructure deficit. Ageing infrastructure, poor maintenance, and chronic under-investment are key challenges. **Kirsten Kelly** asks two engineers from AECOM – a global infrastructure consulting firm – questions about water infrastructure planning.



Willie van der Merwe,
Senior Civil Engineer,
AECOM



Matthew Funnell,
Associate Engineer,
AECOM

Water infrastructure plays an important role in a country's economic development and growth. As engineers, how far into the future do you plan?

Willie: All water service authorities (WSAs) must produce a five-year water services development plan that deals with the provision of water and sanitation services.

They also need to abide by the Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA), which requires a Spatial Development Plan (SDF) that identifies areas and land uses/

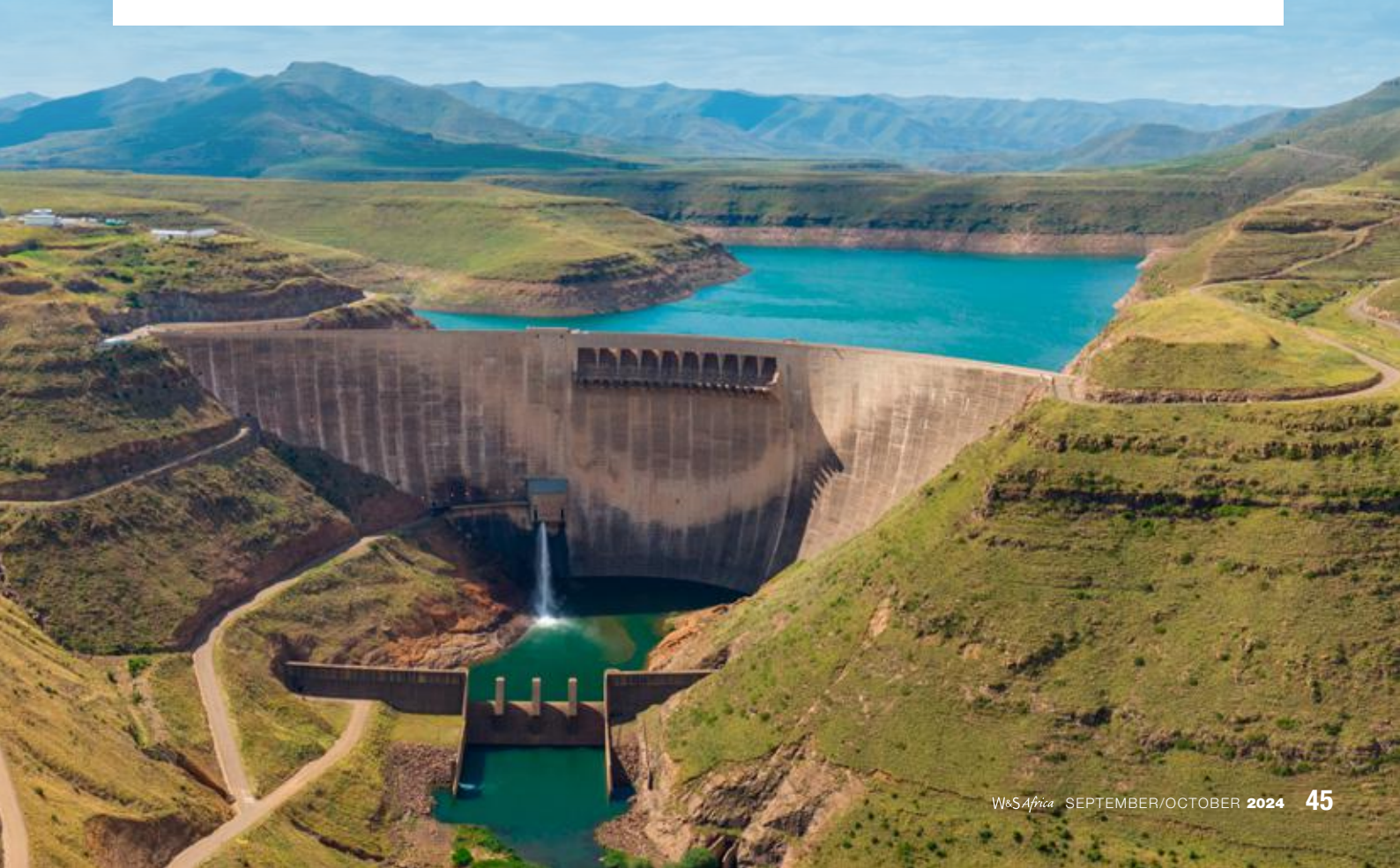
densities to develop within the municipality's boundaries and specifically within the urban edge as defined in the SDF.

The SDF can be utilised to determine water demand and sewer flows. This gives a good indication of the ultimate future water demand, taking into consideration urbanisation, densification, and increase in lifespan. The current water demand can be compared to the future water demand, combined with historical trends and population growth indicators and an estimated timeline can be derived. Typically,

this yields a timeline of 15-55 years before the identified land is developed at current trends.

In an ideal world, infrastructure should be designed based on useful service life. For example, a pipe needs to be built to a size where it doesn't require an upgrade in the near future. A pipeline's service life depends on various conditions, but can last up to 50 years, and even longer with proper maintenance.

One would think that the difference between a 500 mm and a 600 mm pipe is insignificant, but the 600 mm pipe has a 44% bigger





capacity than the 500 mm pipe, with only a 9% cost difference.

In short, we typically plan as far as the SDF allows us to and within the client's budget. Water master plans ideally help WSAs size their infrastructure. The problem lies in the fact that WSAs usually only create a five-year plan and seldom create a master plan, so only a few plans go beyond five years.

This results in water demand growing and additional pipelines being built next to older pipelines, instead of simply building a larger pipeline ten years ago. By saving on costs in the present, WSAs tend to incur greater costs in the future.

And often, even when master plans are created, it has been treated as a paper pushing exercise that lacks the adequate detail to create, for instance tenders for water infrastructure projects. Master plans are supposed to assist WSAs in making decisions.

When planning a project what factors do you need to consider when determining what infrastructure and the size of the infrastructure needed?

Matthew: Water master plans include water demand assessments that are linked to the predicted growth of a community based on spatial development

frameworks and are combined with historical population growth trends.

Once the project area, level of service (LOS) and final water demand assessments is determined and agreed upon, the infrastructure can be sized through concept-level master planning and hydraulic modelling.

In essence, the sizing of water infrastructure is dependent on the volume of water required for a particular community. The size of the infrastructure will depend on factors such as footprint, the type of land development (industrial, commercial, residential, rural), the level of service, and the municipal design criteria.

There are many different factors that play a role when making infrastructure proposals. For instance, the pipeline lengths depend on the size of the area within the master planning project. The diameter of the pipes is dependent on flow rates. Reservoirs are sized typically for 48 hours of storage, but this varies per guideline. Water treatment facilities are dependent on allowable abstraction rates (determined by environment management plans) and demand footprints. Ultimately this also depends on the client's budget. In short, sizing is contingent upon water demand, futureproofing and budget.

What are the differences between infrastructure planning in a rural and urban setting?

Willie: The same standards and guidelines govern the design and construction of water infrastructure, regardless of where it is based.

The minimum requirements for water infrastructure are:

- The minimum amount of water has been set at 25 litres per person per day. Realistically in the Cape Town drought, the water use per person per day reduced to 50 litres. (including business use).
- A reliable water service is one where the service is not interrupted for more than 48 consecutive hours and is available for at least 350 days per year.

The Water Supply Reliability dashboard provides the user with a national as well as provincial presentation of people and households with functional access to basic water supply infrastructure at reconstruction and development programme (RDP) or higher levels of service.

Typically, there are three levels of service (LOS):

- Communal standpipes within 200 m from the dwelling





- Yard taps, a standpipe provided in the erf of a household.
- House connections, direct piped connection to your house as we know in urban areas.

Matthew: Once a communal standpipe is installed, additional dwellings often spring up around it, placing undue strain on the infrastructure as it ends up serving more people than originally intended. Moreover, these new dwellings may eventually exceed the 200-meter distance from the standpipe, complicating efforts to meet service standards. As a result, maintaining adequate service levels becomes a constantly shifting challenge.

Added to that, these standpipes normally need to be replaced every two years. Then there are issues around vandalism where disgruntled communities with no standpipes may vandalise the standpipes in adjacent communities. Rural water supply schemes are exceptionally challenging.

Infrastructure in a rural setting is largely determined by the Level of Service the client or design guidelines (which is typically a district or local municipality) wants to implement. Most rural communities in South Africa rely on local water resources such as boreholes

which can have fairly low groundwater abstraction yields and as a result, the water supply in rural communities also influences the sizing of infrastructure.

Rural areas are typically served by either yard taps or communal standpipes. A rural environment, according to guidelines, typically needs between 25 and 60 litres per person per day.

On the other hand, urban environments require more water as they have a denser population of people, waterborne sewage systems, industries and offices and therefore require more water per person per day.

Urban areas often require a much more reliable source of water security in the form of dams, large water treatment facilities and large multiple water storage tanks due to the size and density of the population. Since urban areas are usually close to municipal service centres, the maintenance and emergency reaction times to attend to repairs are quicker in comparison to rural settings. This emphasises the importance of implementing redundant and robust systems in rural areas due to the long lead times. Hence multiple borehole schemes and multiple-day storage tanks are required to ensure the community is not starved of water.

Are water systems designed to have different levels of reliability/redundancy?

Matthew: The more redundancy built into a water system, the costlier the water system. It is a balance between how critical the infrastructure is and the client's budget. When deciding on redundancy, one must consider the associated cost with a water system failure and the cost of redundant features. Redundancy is also linked to the maintenance of the system itself as well as the maintenance all the redundancy features.

Typically, engineering design should have some degree of redundancy built into water infrastructure; whether it be in the form of warning and protection systems or standby systems that are activated during an emergency. All these additional





WATER PROJECTS INVOLVING AECOM

Andre du Plessis, associate director, Aecom speaks enthusiastically about the various upcoming projects where Aecom is playing a role, “our work will be all over the world.”

- Alula Water and Wastewater multi-disciplinary project in Saudi Arabia, contains bulk water and sewer infrastructure, reservoirs, pump stations and waste water treatment plants
- Cairns Water Security Scheme Stage 1 in Australia, contains bulk water pipelines, raw water abstraction, reservoirs, pump stations, and a water treatment plant
- Mapoon Sewerage Scheme in Australia is a new sewerage network including gravity sewer pipelines, rising mains and pump stations.
- Jeddah Stormwater Pumpstations is multi-disciplinary project in Saudi Arabia, 16 No SW Pumpstations – 400 l/s to 35m³/s
- UK Frameworks, Thames, Caledonia & Irish Water
- MCC Lesotho Irrigation Scheme – 900 ha irrigation project.
- Southern Wastewater Treatment Works in KZN – Upgrade of 108 Mℓ/d sludge system.
- Cape Flats Bulk Sewer – 5 km ND 1000 mm rising main and 1,1 m³/s pumpstation upgrade
- Mkwanazi Rural Water Supply Scheme
- Rehab and Upgrade of Sanddrift Bulk Sewer - Trenchless Rehabilitation (CIPP) of ND 525 mm corroded sewer and upgrading of ND 750mm Bulk Sewer and 200 l/s sewerage lifting pump station

infrastructure items have a cost (both capital and operational) associated with them and the client must be aware that redundant features need to be constantly maintained to ensure they are functional in the event of an emergency. Failure to ensure this will remove the redundancy built into the system.

The levels of redundancy are dictated by the complexity of the system, the probability of failure, and how critical the infrastructure is to ensure reliability. For instance, a pumping system will require a higher level of redundancy than a typical gravity fed pipeline as there is a higher probability that power interruptions or failure of mechanical parts will prevent water conveyance in a pumping system. Critical pieces of infrastructure are normally the sources of water, treatment facilities, reservoirs, and the main water supply arteries (pipelines) linking these facilities. All the infrastructure required to ensure an uninterrupted supply of water should have redundancy built into the system.

Often, certain redundant features are omitted to make projects more feasible. As an engineer, one can very easily overdesign and protect a system increasing its reliability, however, there is a fine line between what features are necessary. This emphasises the important role the engineer has in providing the client with information so they can make informed decisions.

Cost saving is an important factor in every project, how do you approach

cost saving When sizing water infrastructure projects

Matthew: One can save costs through many factors but one must be cognizant of the fact that reducing costs now may end up costing you more in the future. Reducing costs of infrastructure influences the reliability and future proof of the system. For example, to reduce the costs quite simply is to reduce the size of infrastructure, eliminate redundant features and sacrifice quality. This can be achieved by reducing peak factors, decreasing storage times, reducing pumping hours, and eliminating protection mechanisms but this ultimately is at the detriment of the reliability of the system. This is never recommended, and it is always advised that standards and guidelines be followed, and contingencies and redundancy be included. Any planned infrastructure should be designed to allow for future upgrades and expansion, especially if the budgets are constrained initially and as a result infrastructure sizing upgrades are limited to only a couple of years in the future.

A very simple example could be - Instead of constructing a large reservoir to meet the ultimate water storage requirements up until 30 years in the future, rather build a smaller reservoir now but purchase a plot of land to allow for a second reservoir to be built on the same site later. This reduces infrastructure costs now but still allows for upgrades to be implemented in the future therefore ensuring the system is still future-proofed. This is all linked to effective planning. ●

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