FLUID THOUGHTS

WRC CEO, Dhesigen Naidoo

Vaal intervention – Mission critical

The Vaal water system is not only the lifeblood of Gauteng, it is one of the most strategic water assets in the country, on this African continent and a water management area of global significance. The water security it provides daily to 19 million people, more that a third of South Africa's ***de facto*** population almost masks the fact that it provides water security to power and sustain this 1.4% of South Africa's land area that generates close to 34% of its GDP and 10% of that of all of Africa. It is also the recipient of one of the world's biggest transfer schemes, from the highlands of neighbouring Lesotho.

And yet, since the start of mining on the Witwatersrand, this river system has been taken for granted, is substantively overworked, and generally underinvested in post-Lesotho, with respect to infrastructure and very little investment on operations and maintenance. She has been abused. The knock-on effects of that abuse have played itself out in the obvious narrative. The water system can no longer cope. The perennial high demands, low maintenance and refurbishment, years of drought, frequent electricity outages have pushed this system beyond its resilience. And the cracks are widening. The last straw was the report by the South African Human Rights Commission of their investigation into the Vaal Water System. Their findings that the Vaal was "polluted beyond acceptable levels" with impacts on both the environment as well as people's health made national headlines. The further indictment that there were violations of constitutional rights, in particular, the right to human dignity and an environment that is not harmful to health and well being.

In the midst of this water crisis, we continue to see the worsening economic vortex spiralling down in the wake of COVID-19. The StatsSA Quarterly Labour Force Survey for the first quarter of 2021 makes for dismal reading. The official unemployment number now stands at 32.6%. The figures for the youth category are much higher, at an alarming 46.3%. The opportunity cost to the economy of having a potentially productive workforce forced into an idle mode is bad enough, and when you consider the future costs of an unemployed youth and the conversion of a potential demographic dividend into a demographic burden creates negative vistas of tragic proportions.

South Africa in 1976 had a similar picture with a different set of precipitants. Apartheid era Prime Minister, John Vorster, was in a comfortable space. The international outcry following the Sharpeville massacre had long passed, even the international interest over the historical Rivonia Trial, which he presided over in his capacity as Minister of Justice, had transitioned into an era of engagements with newly independent African states, and a new Cold War relationship with Washington. The struggle against Apartheid was at one of its lower ebbs. Enter the Youth of June 1976, in a sweeping political innovation, these brave young people led a protest action that shocked the world with new revelations of the reality of the plight of black people living under Apartheid. It revealed to the global community the sheer brutality of the Apartheid Security machinery in crushing basic human rights, where even children were not spared. This was a crucial point in the Struggle and greatly energised the international Anti-Apartheid movement that eventually saw the demise of this political system that was declared a crime against humanity.

In that same spirit and in response to the various reports and outcries for action in the Vaal system, Minister of Human Settlements, Water and Sanitation, Lindiwe Sisulu, obtained Cabinet approval for a section 63 (Water Services Act) intervention in the Vaal system and specifically the Emfuleni municipality. The critical political innovation here is both the spirit and strategy of the intervention. In contrast with a national takeover of a provincial or local function as we have seen in other examples, this is one of partnership for which Emfuleni Mayor, Gift Moerane, expressed both gratitude and support. The R8 billion intervention covers the refurbishment of the water services infrastructure, a full-scale revival of the Leeukuil and Sedibeng wastewater treatment plants championed by the Department of Water and Sanitation, and an operation and maintenance component managed by Rand Water.

There are three features in the plan that are particularly attractive. The first is that it is a comprehensive plan as opposed to crisis management, with a firm view on long-term sustainability. The second is that the strategic rollout is paying particular attention to building capacity and capability to deliberately expand and diversify the water and sanitation team with a strong emphasis on local capability to make the new water management system sustainable beyond the intervention. Already the participation of women and youth are high on the agenda, and is already visible in the first set of contractors that have been appointed. The third is to take advantage of the best appropriate knowledge and innovations, flowing from the South African science community

via the Water Research Commission, so that we have genuine 21st century solutions in this strategic water area.

It is only the beginning and the critique of great plans not being realised in implementation is appreciated, but, in this Youth Month 2021 we have a real opportunity to catalyse a change of water fortunes through this Vaal intervention. One that will be formative for water security, a step closer to the realisation of human rights and a point of inspiration.

The Vaal River is known as South Africa's hardest working river, supporting a population of 19 million people.

NEWS

Sector mourns the loss of pioneer professor

The South African water sector mourns the loss of a beloved pioneer in the wastewater and sanitation space.

Prof Chris Buckley, co-Director of the Water, Sanitation & Hygiene Research & Development (WASH R&D) Centre, at the University of KwaZulu-Natal, passed away peacefully at home on 27 May from cancer at the age of 72.

"Chris was a well-known, iconic figure in the international water and sanitation field, and touched the lives of so many, both personally and professionally. He was one of those unique people that always managed to inspire everyone with his astonishing general knowledge, and deep understanding of science and engineering," said the WASH R&D Centre in a tribute. "Chris's compassion, patience and dedication to students and young researchers resulted in the completion of over 100 Master's and PhD graduates, the majority of whom are now well-established professionals in the water and sanitation sector. Each one of them carries a piece of Chris's passion, determination to solve problems, and his love for life and learning. His charismatic personality, radiant smile and mischievous sense of humour will forever be remembered."

Prof Buckley's career in the water and sanitation field began in the 1970s as a post-graduate student in Chemical Engineering at the then University of Natal. He joined the Pollution Research Group (PRG) in 1972 – a small group of three or four people that had been formed in 1971. He took over the leadership of the PRG in 1985 and was appointed as the full-time head in 1987. Under his guidance, the PRG has delivered groundbreaking research in the water and sanitation field, and expanded its research scope beyond chemical engineering, to become a trans-disciplinary contract research hub with local, national and international recognition for its work.

Over the span of his 50-year research career, Chris secured significant funding grants from organisations such as the Water Research Commission, the eThekwini Municipality and the Bill & Melinda Gates Foundation, as well as many other public and private organisations. His commitment to producing high quality research outputs, and his ability to adapt to the changing research landscape, has ensured that these funding relationships have endured under his leadership. In order to reflect the growing range of research undertaken by the group, the PRG was rebranded and relaunched as the Water, Sanitation & Hygiene Research & Development Centre in December 2020.

Prof Buckley was the recipient of the WRC's first ever Legend Award early in 2021. He leaves behind his wife Ann, his daughter Pippa, his son Tim, his son-in-law Tim, daughter-in-law Stephanie and five granddaughters.

Minister Sisulu calls on engineers to contribute to SA's development agenda

The Minister of Human Settlements, Water and Sanitation, Lindiwe Sisulu, has called on engineers to patriotically contribute to the development agenda of the country.

Sisulu made this call while delivering a virtual keynote address at a breakfast seminar hosted by the National Society of Black Engineers (NSBE). She was addressing members of the NSBE on the role of local engineers in the execution of the National Water & Sanitation Master Plan.

"Today's global challenges, such as climate change and the COVID-19 pandemic, require engineering minds that would offer ground-breaking solutions aimed at accelerating economic recovery," she said.

Minister Sisulu added that the country needs engineers that will take a lead in realising "our vision of new human settlements that provide housing and comfort to our people, engineers that will help change the spatial orientation of apartheid cities and towns."

Addressing the issue of shoddy workmanship Minister Sisulu implored members of the NSBE to shy away from corruption, not sign off poorly constructed infrastructure projects and not bow to pressure to compromise technically sound decisions.

New guide on how to manage invasive alien plants

Landowners are required by law to take the necessary steps to control and eradicate invasive alien plants, but this is often more easily said than done – which is one of the reasons why WWF and its partners have published a new guide on the subject.

Available for free download in English and Afrikaans, ***A practical guide to managing invasive alien plants: A concise handbook for land users in the Cape Floral Region,*** will be of value to landowners, land managers and clearing contractors, providing context, examples, and practical guidelines.

The Cape Floral Region is a renowned biodiversity hotspot and the world's smallest plant kingdom with the highest species variety. Yet, large parts of this special landscape are heavily infested with fast-spreading and thirsty exotic plants and trees. Most species of invasive alien plants found in South Africa come from Australia and South America. Without their naturally occurring pests, whether insects, fungi, or diseases, they grow undeterred and multiply rapidly.

The Madeira vine from South America, for example, smothers indigenous trees like the protected milkwoods while Port Jackson, pine, wattle, and gum trees use far more water than indigenous vegetation. These 'alien' species also crowd out local species and compete for water and nutrients. And, as we've witnessed with the Cape Town fires recently, some cause wildfires to burn more intensely and spread more easily, putting people and property at risk.

Critically, though, the mountainous regions of the Cape Floral Kingdom are also important water-supplying areas generating freshwater for millions of urban dwellers, food-producing farms and other industries and communities.

Ruth Beukman, Freshwater and Policy Lead with WWF South Africa, comments: "With the invasion of water-intensive exotic plants being one of the top threats to the health of our critical water source areas and thus our water security, it is imperative that we all play a part in managing this threat. To this end, it is important that we work in partnership to enable and empower land users, landowners, local communities, and private companies to take ownership of, and action in, addressing this risk to the health of their land, the ecosystems, water supply, their property, and livelihoods."

The guide was a collaborative effort, put together with the help of subject experts in government, the City of Cape Town, private businesses, and other NGOs. It is a practical nine-chapter manual with colour-coded sections for easy reference. The numerous authors are experts in the field and have many years of combined experience in dealing with alien plants within their respective professions.

The information is based on the latest policies and legal requirements and consists of guiding principles of best practice methods to empower land users to develop a management plan to control these landscape-damaging alien plants. It also includes a section on how to successfully rehabilitate land that has been cleared.

To download the English guide, Visit: https://wwfafrica.awsassets.panda.org/downloads/a_practical_guide_to_managing_invasive_alien_plants_web.pdf and for the Afrikaans, Visit: https://wwfafrica.awsassets.panda.org/downloads/afrikaans_managing_invasive_alien_plants_web.pdf

GLOBAL

More than half of the world's rivers run dry now and then

Researchers have found in a new study that between 51% and 60% of the 64 million kilometres of rivers and streams on Earth that they studied periodically stop flowing, or run dry for part of the year.

The study is the first-ever empirically grounded effort to quantify the global distribution of non-perennial rivers and streams. The research, which appears in ***the journal Nature***, calls for a paradigm shift in river science and management by revising foundational concepts which traditionally assumed year-round water flow in rivers and streams.

The map of non-perennial rivers resulting from the study, the first of its kind, also provides crucial baseline information for the assessment of future changes in river flow intermittence and for determining and monitoring the role of these rivers and streams in global water and biochemical cycles, as well as in supporting biological diversity.

"Non-perennial rivers and streams are very valuable ecosystems as they are home to many distinct species that are adapted to cycles of water presence and absence," says first author Mathis Messager, a PhD student both in geography at McGill University and at the French National Research Institute for Agriculture, Food, and Environment (INRAE).

"These rivers can provide critical water and food sources for people and they play an important role in controlling water quality. But more often than not they are mismanaged or altogether excluded from management actions and conservation laws as they are simply overlooked."

To identify the most important environmental characteristics in determining whether a river periodically ceases to flow, the researchers statistically associated long-term records of water flow in 5 615 locations around the world with information on the hydrology, climate, geology, and surrounding land cover of the rivers and streams monitored at these locations. They found, as expected, that non-perennial rivers are most common in arid places (where there is much more evaporation than rainfall) and that smaller rivers and streams have generally more variable flow and are thus more likely to dry up. But they also occur in tropical climates and even in the Arctic where rivers freeze up for parts of the year.

The study also suggests, based on preliminary estimates, that more than half of the world's population lives in locations where the closest river or stream around them is non-perennial. Indeed, in many languages, multiple words exist to designate these types of watercourses and their mark on the landscape, highlighting the long history of inter-dependence between humans and seasonal freshwater systems.

To access the original article, Visit: https://www.nature.com/articles/s41586-021-03565-5

Satellite-based monitoring to reduce impact of natural disasters

A consortium of Inmarsat, the world leader in global, mobile satellite communications with SINTEF, one of Europe's largest independent research organisations, and fellow Norwegian company, Geonor, has been awarded a three-year contract with the European Space Agency (ESA) to develop a natural disaster early warning system.

Using Inmarsat's global L-band satellite network the consortium will develop a new government grade Internet-of-Things solution that can provide early warnings in the event of a natural disaster, even in the most remote locations. This new technology has two important advantages over existing solutions: global coverage and security, thus making it suitable for government applications. "The objective is to demonstrate the use of a secure solution that will support civil government users to help reduce risks from geohazards, such as landslides, rock fall, avalanches, debris flow and floods," noted senior SINTEF researcher, Ivan Depina.

The solution is supported by ESA as part of the 'Space Systems for Safety and Security (4S)' programme, which is a new component of ESA's advanced research in telecommunications systems. The programme aims to transform research and development initiatives to successful commercial products and services.

The project is also supported by the Department of Energy and Water and the UK Space Agency and Norwegian Space Agency.

Re-thinking single-use plastics in the tourism sector

The World Travel & Tourism Council (WTTC) and the United Nations Environment Programme (UNEP) launched a new report in June addressing the complex issue of single-use plastic products within the travel and tourism sector.

The publication, ***Rethinking Single-Use Plastic Products in Travel & Tourism***, launched as countries around the world begin to reopen, and the travel and tourism sector starts to show signs of recovery from the COVID-19 pandemic which has been devastating. The report is a first step to mapping single-use plastic products across the travel and tourism value chain, identifying hotspots for environmental leakages, and providing practical and strategic recommendations for businesses and policymakers.

It is intended to help stakeholders take collective steps towards coordinated actions and policies that drive a shift towards reduce and reuse models, in line with circularity principles, as well as current and future waste infrastructures. The report's recommendations include redefining unnecessary single-use plastic products in the context of one's own business; giving contractual preference to suppliers of reusable products; proactively planning procedures that avoid a return to single-use plastic products in the event of disease outbreaks; supporting research and innovation in product design and service models that decrease the use of plastic items, and revising policies and quality standards with waste reduction, and circularity in mind.

Single-use plastic products can be a threat to the environment and human health and without deliberate effort across the sector, travel and tourism can and will contribute significantly to the issue. The COVID-19 pandemic has had both negative and positive impacts on single-use plastics pollution.

The demand for single-use plastics items has increased with safety being a high concern among tourists and take-away services being on the rise. According to the Thailand Environment Institute, plastic waste has increased from 1 500 tons to a staggering 6 300 tons per day, owing to soaring home deliveries of food. However, the pandemic has also catalysed consumer demand for green tourism experiences around the world, with a 2019 global study finding 82% of respondents are aware of plastic waste and are already taking practical actions to tackle pollution.

The report recognises that global solutions are required to address corporate concerns about the use of single-use plastic products. It aims to support informed decision-making based on the potential impacts of trade-offs and of unintended burden shifting when considering the transition to sustainable alternatives.

To access the report, Visit: https://wedocs.unep.org/bitstream/handle/20.500.11822/36324/RSUP.pdf

SURVEY POINTS TO LACK OF REGULATION IN PLUMBING SECTOR

Do municipalities have the capacity to adequately control plumbing work conducted in their areas? This is the question asked by the Institute of Plumbing South Africa (IOPSA) in recently published research.

IOPSA is a non-profit organisation which represents the interests of approximately 1 000 companies active in the plumbing industry in South Africa. Around 80% of its members are plumbing companies and 75% of those are small, medium and micro enterprises.

The organisation embarked on a research programme in 2018 to gain better insights into the sector. In March the institute, with the assistance of the Plumbing Industry Registration Board, undertook a local authority survey. The aim of the survey was to obtain relevant information on the local municipalities and the knowledge and service of the building control officers and the water inspectors as well as the plumber's knowledge and access to the municipalities' bylaws.

The survey, which was distributed electronically, received 330 responses. Most respondents are located in Gauteng (145 responses), followed by the Western Cape (62) and the Eastern Cape (47).

In response to a question regarding municipal bylaws, the majority of respondents (72%) indicated that their local municipality does have water bylaws. Surprisingly, almost a quarter of respondents (24%) did not know if their municipality had water bylaws or not. Further, only 45% of respondents who advised that their local municipality had water bylaws actually had a copy of the bylaws, with the majority responding that they did not have a copy.

In response to a question regarding municipalities' capacity to control plumbers, over 65% of respondents indicated that they did not feel that their local municipality has the capacity to control all the plumbers in their area. Almost half (43%) did not know whether their municipality had water inspectors.

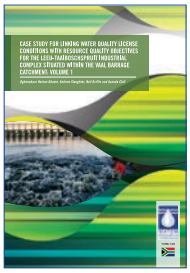
With regards to the registration of plumbers by local authorities, more than half of respondents (52%) indicated that their local municipality does not keep a register of plumbers. A further 20% indicated that they didn't know while 28% of respondents indicated that their municipality does register plumbers. Of the latter only 35% are registered with their local municipality.

"The survey results clearly demonstrate that there is little or no control of plumbers or plumbing work within municipalities," reported IOPSA in the final survey report. "Previous surveys and research conducted by IOPSA have revealed that the single biggest concern for most qualified plumbers is the impact of unqualified individuals on their businesses."

Research has also shown that of the estimated 125 000 people who identify themselves as plumbers, only around 15 000 to 18 000 of them are actually qualified. The apparent lack of enforcement within municipalities is likely a significant factor in this state of affairs.

The National Building Regulations stipulate that only qualified plumbers may conduct plumbing work, and places the responsibility on local authorities to enforce this. South Africa is a water scarce country and it is expected that by 2030 demand will significantly exceed supply. Plumbers play a crucial role in water management and ensuring that only suitably qualified individuals are allowed to work on water systems may prove critical for the future of South Africa, IOPSA concluded.

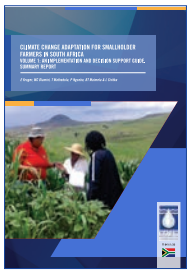
NEW WRC REPORTS



Case study for linking water quality license conditions with resource quality objectives for the Leeutaaiboschspruit Industrial Complex situated within the Vaal Barrage Catchment

In South Africa, the resource-directed measures and the source-directed controls are the two complementary strategies designed to ensure that water resources are used and protected. To be able to use the two complementary strategies effectively, it is important that the link between them is clarified. This study was thus aimed at developing a decision support system (DSS) for clearly linking water quality standards in water use licensing conditions to gazetted resource quality objectives, and/or site-specific conditions in the Vaal Barrage catchment, taking into account a range of complex interacting factors, such as all components of flow (flow regime, timing, pattern, frequency and magnitude), land use types, upstream waste loads, and diffuse and point effluent emitters. To realise the very essence of the project, the DSS developed in this way must be scientifically credible, defensible and transparent – based on scientific assumptions, observed and modelled data, confidence and limitations; and the process of its development must involve multiple stakeholders, including the regulator (the Department of Water and Sanitation) and resource users within the Vaal Barrage catchment.

Report no. TT 838/1/20 (Volume 1) and TT 838/2/20 (Volume 2)



Climate change adaptation for smallholder farmers in South Africa

Climate Smart Agriculture (CSA) promotes increases in productivity and adaptation to climate change that encompass socially and environmentally responsible agriculture. Numerous approaches, technologies and practices to support CSA are already available. CSA includes both traditional and innovative agricultural practices and technologies that promote agricultural productivity and generate income, while boosting resilience to climate change. The research objectives of this project were to, among others, evaluate and identify best practice options for CSA and Soil and Water Conservation (SWC) in smallholder farming systems in two bioclimatic regions in South Africa; amplify collaborative knowledge creation of CSA practices with smallholder farmers in South Africa; test and adapt existing CSA decision support systems (DSS) for the South African smallholder context.; and evaluate the impact of CSA interventions identified through the DSS by piloting interventions in smallholder farmer systems, considering water productivity, social acceptability and farm-scale resilience.

Report no. TT 841/1/20 (summary report) and TT 841/2/20 to TT 841/9/20 (Support guide and farmer handouts)

Quantification, fate and hazard assessment of HIV-ARVs in water resources

South Africa still has one of the highest HIV incidence rates in the world, the largest treatment programme, and therefore the greatest consumption of antiretroviral drugs per capita, with prescribed amounts of up to several tons per year. The national rollout of antiretrovirals began in 2005, with the objective of one service point in each of the 53 districts of South Africa. Since then, it has improved the quality of life and the historical pattern of mortality in South Africa. However, there may be subtle, yet unquantified effects and processes that need to be better understood. These include environmental concentrations of the drugs, secondary human exposures, effects on aquatic life, and social considerations. These interactions are the subject of this Water Research Commission report. A major objective of this study was to standardise a method for sampling, extraction, and analysis of antiretroviral and antifungal compounds. It is already an achievement to identify these compounds in the environment at such low concentrations. However, these methods need to be accurate and trustworthy in order for universal standards and monitoring systems to be implemented in the future. This project includes the physical and chemical characteristics of the targeted compounds.

Report no. 2594/1/19 (Vol 1) and 2594/2/19 (Vol 2)

Risk-based site-specific freshwater recreational water quality guidelines

The South African Water Quality Guidelines of 1996 are one of the most widely-used tools in water quality management in South Africa. A Department of Water and Sanitation (then Department of Water Affairs) initiative looking at a needs assessment developed a general philosophy with general specifications recommended for a decision support system for revised water quality guidelines for South Africa. The 1996 guidelines were based to some extent on a risk philosophy; the updated guidelines proposed follow a risk-based approach. While the scope of the guidelines remains applicable to any inland water used for recreational purposes, an important improvement of the revised guidelines is the site-specific and user-specific nature of the guidelines, allowing greater input and management of water use. In addition, they are available primarily in a software-based decision support system.

Report no. TT 831/1/20 (description of the DSS), TT 831/2/20 (technical support document)

To download any of these reports,
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