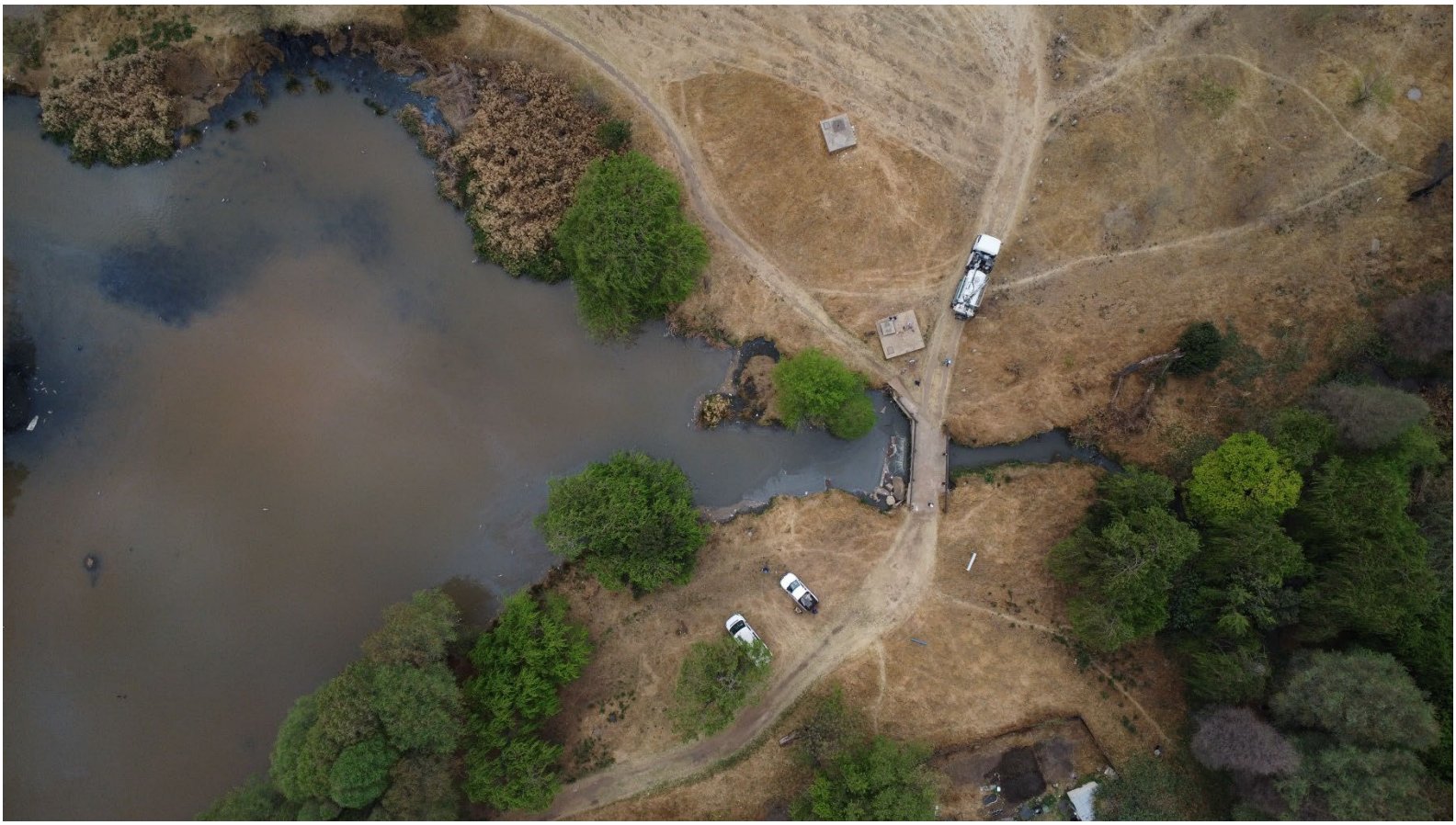
Celebrating 30 years of democracy in South Africa: Responding to a global water crisis in the SA context – Access, Quality and Dignity.



Picture of a sewage spill at Gillooly's Farm in Bedfordview.

Proceedings of the webinar

Tuesday 12 November 2024 / Time: 14:00 – 15:30

Hosted by UJ's Process, Energy & Environmental Technology Station

[UJ PEETS]

Introduction

South Africa faces significant water challenges due to increasing demand, climate change, and widespread pollution, placing pressure on already limited freshwater resources. Economically, water scarcity disrupts industries such as agriculture and mining, while insufficient infrastructure hinders equitable distribution and sustainable development. Socially, unequal access to clean water exacerbates disparities, affecting health, livelihoods, and the resilience of vulnerable communities. As South Africa commemorates 30 years of democracy, the nation reflects on a transformative journey that began with the historic 1994 elections.

The University of Johannesburg (UJ) invited an online audience to join a team of panellists to discuss their diverse and expert views on Access to Water and Mitigating Climate Change. Since 1994, South Africa has significantly expanded access to clean water by implementing programs like the Reconstruction and Development Programme, which provided millions of people with improved water services. The country adopted the National Climate Change Response Policy to mitigate climate change. It invested in renewable energy initiatives such as the Renewable Energy Independent Power Producer Procurement Programme to reduce greenhouse gas emissions. These efforts demonstrate South Africa's commitment to sustainable development by enhancing water accessibility and actively addressing climate change impacts.

The panel

The event was organised with UJ PEETS and Dr Marlene van der Merwe-Botha, a senior research associate at the University of Johannesburg and director of Water Group Holdings. Dr Marlene is an Industrial Bacteriologist specialising in industrial and domestic wastewater treatment, particularly anaerobic digestion of sludge. She worked for 12 years in local government, heading up the water and sanitation engineering department. Marlene has been involved with developing and implementing the Green, Blue and No Drop audits since their inception by the Department of Water and Sanitation. She has worked closely with many municipalities and stakeholders as an advisor and technical expert in wastewater treatment, risk assessment, energy efficiency and

renewable energy, sludge management, drinking water quality and compliance audits. Marlene outlined the past, present and future considerations in responding to the global and local crises in energy, drinking water, sanitation and water resource management.

Dr Kousar Banu Hoorzook from UJ PEETS undertook the first presentation. Dr Kousar is a water and health specialist with expertise in biotechnology, biomedical technology, bacterial virulence, bacterial antimicrobial resistance, water quality and water pollution. She heads the water unit within UJ PEETS, which is mandated to improve the competitiveness of industry and SMEs by applying specialised knowledge and technology and facilitating the interaction between industry and academia to enable innovation and technology transfer to grow the green economy.

Dr Jo Burgess was the second-panel member. She is the Head of Trial Reservoir, affiliated with Isle Utilities, to accelerate the uptake and application of technologies to take the water industry and adjacent sectors towards net zero carbon and sustainability. Dr Jo has expertise in environmental biotechnology. Dr Jo emphasises that South Africa grapples with a pressing water crisis exacerbated by climate change. Thus, the stakes have never been higher. Natural ecosystems are under siege, with climate variability threatening their ability to regulate water quality and availability. Her views are informed by industry statistics showing that the water industry is responsible for a staggering 1.4% of global carbon dioxide emissions, 3.8% of methane and 3% of nitrous oxide emissions. Yet, this sector holds the key to reversing these trends. By prioritising the protection and restoration of ecosystems through improved wastewater treatment, we can significantly enhance resilience against climate impacts, mitigate flooding risks, and safeguard public health and biodiversity. The exciting news is that the technologies and strategies to achieve these goals are already at our fingertips. However, integrating them into everyday practices remains challenging in this highly regulated industry. This is where innovative financing mechanisms and strategic partnerships come into play - by derisking the adoption process; we can accelerate change and amplify our positive impact on the environment and society.

Prof Tobias George Barnard Director of the Water Health Research Centre at the University of Johannesburg was the third panel member in this webinar. His research includes population, infrastructure, economic development, and health-related to water, sanitation, and hygiene. Dr Tobias' expertise lies within the field of Biochemistry. He has been recognised for his work in PCR detection of bacterial pathogens from water samples in SA and enzyme characterisation in France, and he has won the IWA Investigator award, WRC awards, and various patents.

Prof Tobias shared his views on a thought-provoking reflection on South African communities: the forgotten beneficiaries of research. It is well known that South Africa is facing problems regarding water and wastewater services and that the communities are suffering from this. As researchers, we study these problems and somehow forget that our work needs to benefit the general community as much as the scientific community. The work presented focuses on three of these problems. The first is "the last 100m", which shows how the simple water collection and storage step still impacts water quality and health. This directly links to the second problem, "dirty hands, dirty water", how hygiene practices influence the water quality and health that can be avoided using simple published methods and technologies. Lastly, it takes us, as researchers, years to understand our processes and data, but we expect the public to understand the data and not "freak out". It is vital to ensure that we package data in a manageable manner and engage with the communities to teach them how to interpret the data or what questions to ask.

Prof Christopher Curtis from the Department of Geography & Environmental Management & Energy at the University of Johannesburg was the fourth expert to join the panel. He is a biogeochemist and field scientist interested in environmental change in aquatic systems. His expertise and research lay within physical geography, biogeochemistry, and environmental science, focusing primarily on the impacts of water and air pollution and climate change on wetlands, lakes and streams from Africa to the Arctic. His current research looks at the multiple pressures on aquatic systems in Southern Africa, including acid mine drainage, eutrophication, climate change, aquatic invasive species and feedback into greenhouse gas emissions. More

recently, he has been exploring the potential roles of community activism and citizen science in the monitoring, protection and stewardship of threatened aquatic resources.

Prof Christopher engaged delegates on a topic close to many hearts and minds: Alien Invasive Plants: a barometer of our success in implementing Integrated Water Resource Management (IWRM). The advent of democracy in South Africa was associated with new legislation, such as the National Water Act of 1998, which has been held up as some of the most progressive legislation of its kind in the world. At its core is the concept of IWRM, whereby the competing demands for water resources are managed in an integrated and sustainable way with social, economic and environmental considerations across a river basin or catchment. The spatial units for implementing IWRM are the Catchment Management Agencies tasked with providing equitable access to water resources and related economic opportunities. As "access" to water resources and infrastructure has expanded, this has often outpaced planning and capacity considerations in rapidly urbanising areas like the Gauteng City Region. Population growth planned and unregulated sprawl of formal and informal settlements, and urban infrastructure unable to keep pace with new developments have all contributed to challenges with water supply and water security for the human population. One of the more visible challenges symptomatic of service delivery issues in wastewater treatment is the expanding problem of aquatic alien invasive plants like the water hyacinth and water lettuce. The problem proliferates in a literal sense and provides a harsh reminder of the need for proper Integrated Water Resource Management. A dedicated coalition of stakeholders will be required to tackle this challenging problem.

Mr Solomon Makate from the Department of Water & Sanitation was the final panel member. Mr Solomon is responsible for regulating water services, specialising in Drinking Water Services but with a vast background in wastewater management. He heads up the national Drinking Water Quality Consultative Audits through Blue Drop Certification programmes and is a qualified lead inspector and moderator for Blue and Green Drops. He was closely involved in developing incentive- and risk-based regulation and reporting since 2014 and spearheaded the revision of Regulation 2834 through to its current form as Reg. 3630 for Process Controllers and Treatment

Works under the Water Services Act. His work in the Integrated Regulatory Information System (IRIS), SANS 241 and data management of 1036 water supply systems, registration of laboratories, incident management such as the likes of Delmas, water quality monitoring of various water resources and heading up the Aqua Enduro bursary scheme. He represented South Africa at the Japan International Cooperation Agency, leading a team of 21 specialists from different municipalities for capacity building with the Tokyo Metropolitan Government. He was part of the BRICS delegation to International Trade and Economic Development in Moscow in 2018. He currently serves on the Technical Task Team, which cooperates with the Russian federal government on wastewater capacity building and technological issues.

Solomon explained that, with the introduction of incentive-based regulation in the form of Blue Drop, Green Drop and later, No Drop, DWS sought to focus on the regulation of the entire water and sanitation value chain instead of focusing on the regulation of the final output water and effluent, which proved to be inefficient. This has enabled the department to identify core issues impacting service quality and their bottlenecks. This report, together with a range of other initiatives such as national water policy (2013), National Sanitation Policy, Water and Sanitation Master Plan, NWRS (1&2), etc, has resulted in a legislative review to address the challenges and risks identified in a sustainable way and secure water for generations to come. Mr Makate selected a few critical problem areas and outlined how DWS is addressing these. His talk gave delegates the latest developments on the amendment of the water legislation, Regulation 3630, the draft Norms & Standards for Water Services Regulation, intensifying regulation and litigation measures, the Water Partnership Office, and the status of No Drop, Blue Drop and Green Drop assessments.

The programme

Over the one-and-a-half-hour webinar, 124 participants joined the event. Participants were from many industries across South Africa, including NPOs, local government, environmental consulting, mining, education and finance.

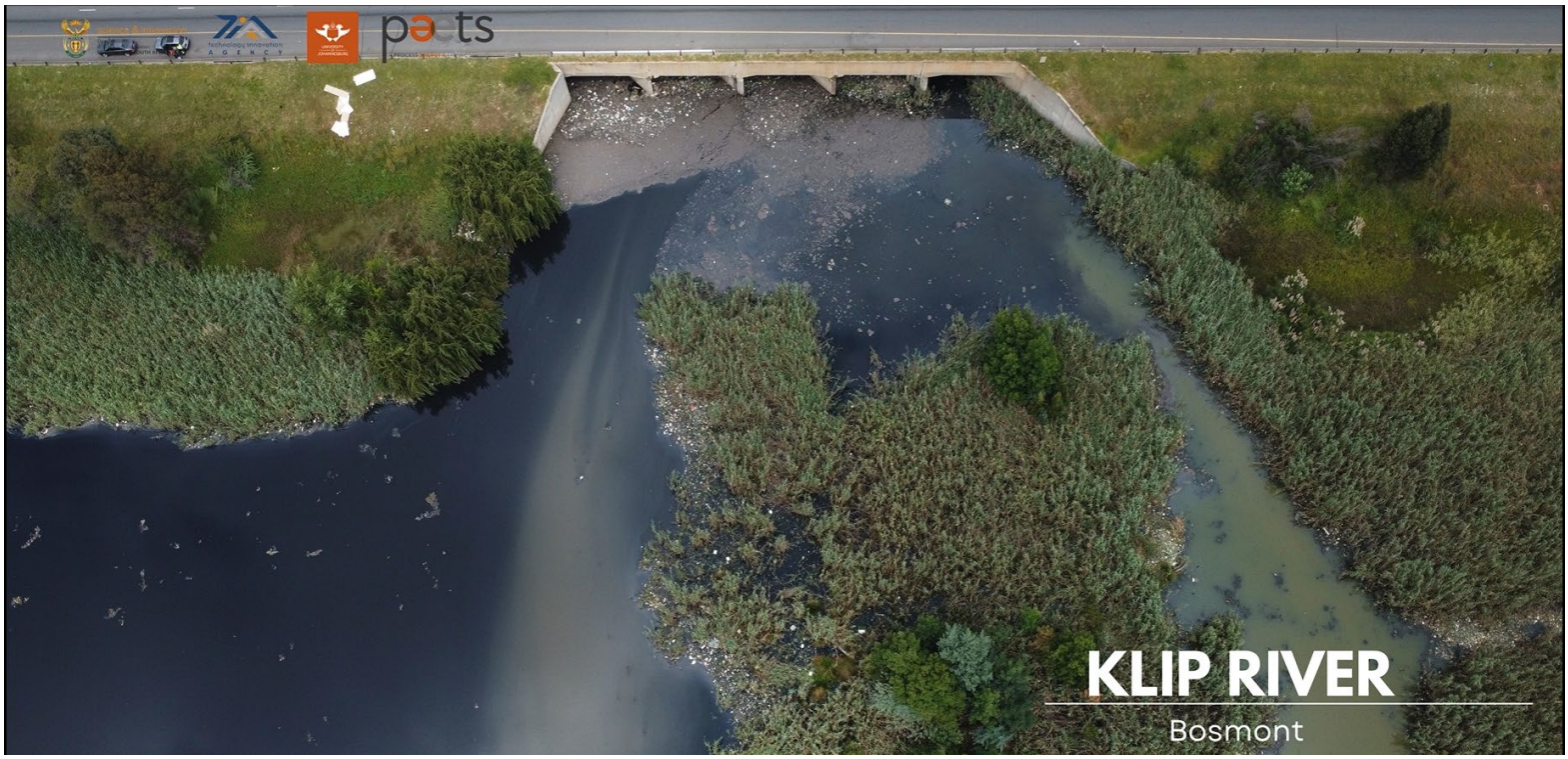
Dr Marlene van der Merwe-Botha gave the opening address. She presented the context behind the webinar, speaking to the topics of 30 years of a celebrated democracy, the present and response to a water crisis, the future leading into 2025, and the development of a water crisis.

Since the advent of democracy over the past 30 years, South Africa has made remarkable strides, establishing itself as a global leader in water governance. The country introduced world-class water legislation and progressive regulations emphasising equity and access in service delivery, ensuring the human right to water is upheld. Through integrated water resource management, comprehensive plans, and strategies, South Africa has laid a strong foundation for sustainable water use while modernising and investing in critical infrastructure to meet its people's and economy's needs.

South Africa is taking proactive measures to address current challenges and secure its water future in response to ongoing water crises. The amendment of water legislation aims to strengthen governance and adapt to emerging needs, supported by increased enforcement and regulation to ensure compliance. Technological solutions are being deployed alongside initiatives focused on energy efficiency, renewable energy, and climate change responses to enhance resilience. Collaborative water partnerships and innovative operational solutions further drive sustainable management and equitable access to water resources.

As South Africa approaches 2025, the development of water crises highlights critical challenges that require urgent attention. Funding and human resource constraints and ageing, dysfunctional, and under-capacity infrastructure have hindered progress in addressing water demands. Pollution of natural water resources, fragmented planning, and governance issues, including accountability and mismanagement, further exacerbate the situation. Public and environmental health concerns are mounting, driven by the dual pressures of climate change impacts—such as floods and droughts—and inadequate systems to mitigate these risks effectively.

Then, Dr Marlene introduced the expert panel, their affiliation, and the topic. The first-panel member to present was Dr Kousar Hoorzook, who presented an introduction to the University of Johannesburg's Process, Energy & Environmental Technology Station (UJ PEETS). Dr Kousar used a video on the work being done at UJ PEETS as her presentation.



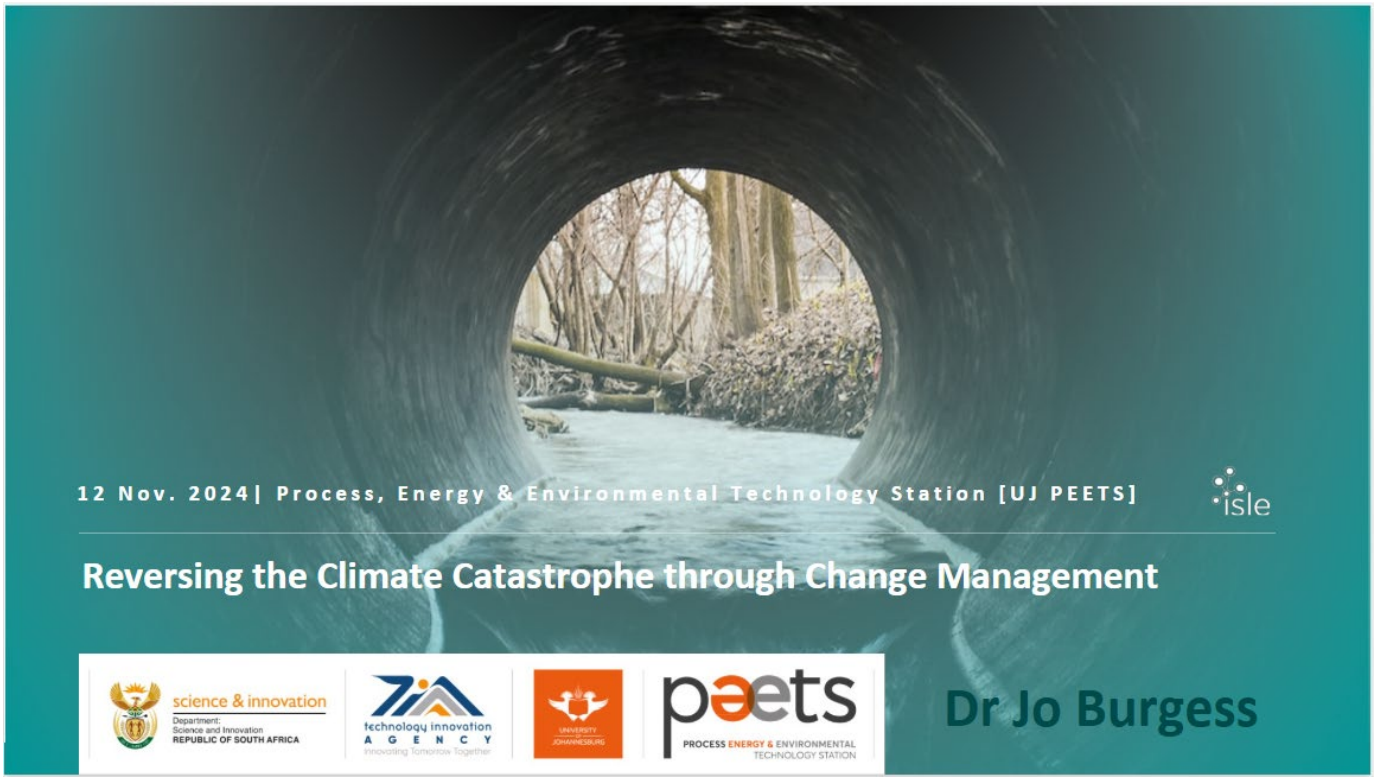
Picture of pollution within the Bosmont Spruit, a tributary within the Klip River system. A site called UJ PEETS draws water samples.

The video highlights the diverse and impactful work undertaken by UJ PEETS, focusing on addressing environmental challenges in and around Johannesburg. Specific projects include the ongoing efforts to improve water quality in local rivers through advanced testing and analysis techniques. These projects identify pollutants and trace them to their upstream sources, such as industrial activities and other human impacts. By linking water quality results to potential polluters, UJ PEETS contributes to evidence-based interventions that protect aquatic ecosystems while promoting accountability and compliance with environmental regulations.

Beyond water quality, the video underscores the importance of fostering collaboration between industry, communities, and academia to address pressing environmental issues. UJ PEETS serves

as a bridge, facilitating these partnerships to co-develop sustainable solutions that are both innovative and practical. The station's approach highlights the interconnected nature of environmental challenges, where shared knowledge and resources lead to meaningful progress. By aligning stakeholders' interests, UJ PEETS is driving projects that restore and protect Johannesburg's rivers, empower communities and support industries in adopting more sustainable practices.

Following Dr. Kousar presentation, Dr. Marlene introduced the next panel member, Dr. Jo Burgess. Dr. Jo discussed Reversing the Climate Catastrophe through Change Management.



The presentation underscores the critical role of the water sector in contributing to and mitigating greenhouse gas emissions globally. It highlights the significant emissions from water supply, wastewater collection, treatment, and onsite sanitation, with varying impacts across regions such as East Asia/Pacific and Europe/Central Asia. The global push for water utilities to adopt net-zero

targets is gaining momentum, with regions like Europe/Middle East leading at 60% adoption, showcasing the urgency for innovative solutions to decarbonise the sector. However, disparities in progress across regions emphasise the need for tailored strategies and collaborative approaches to bridge the gap.

A central theme of the presentation is the exploration of practical strategies to improve efficiency and reduce emissions within water utilities. This includes optimising energy use through digital solutions like pump scheduling, hydraulic modelling, and leveraging biogas strategies for onsite energy generation. Policy frameworks and innovative financing mechanisms, such as the Trial Reservoir initiative, are showcased as vital tools to derisk trials for new technologies, enabling utilities and vendors to adopt sustainable practices with reduced financial risks. These measures enhance operational efficiency and create pathways for scalable climate mitigation actions.

To overcome barriers to innovation, the presentation highlights the importance of fostering collaboration, engaging stakeholders, and aligning technological advancements with user needs. Strategies for addressing challenges like unclear value propositions and organisational resistance are provided, emphasising robust processes and executive sponsorship. The presentation outlines a roadmap for reversing climate impacts in the water sector while accelerating global sustainability goals by integrating lessons from pilot projects and leveraging partnerships with industries, governments, and communities.

Following Dr Jo's presentation, Dr Marlene introduced the next panel member, Prof Tobias George Barnard. Prof Tobias discussed South African communities: the forgotten beneficiaries of research.

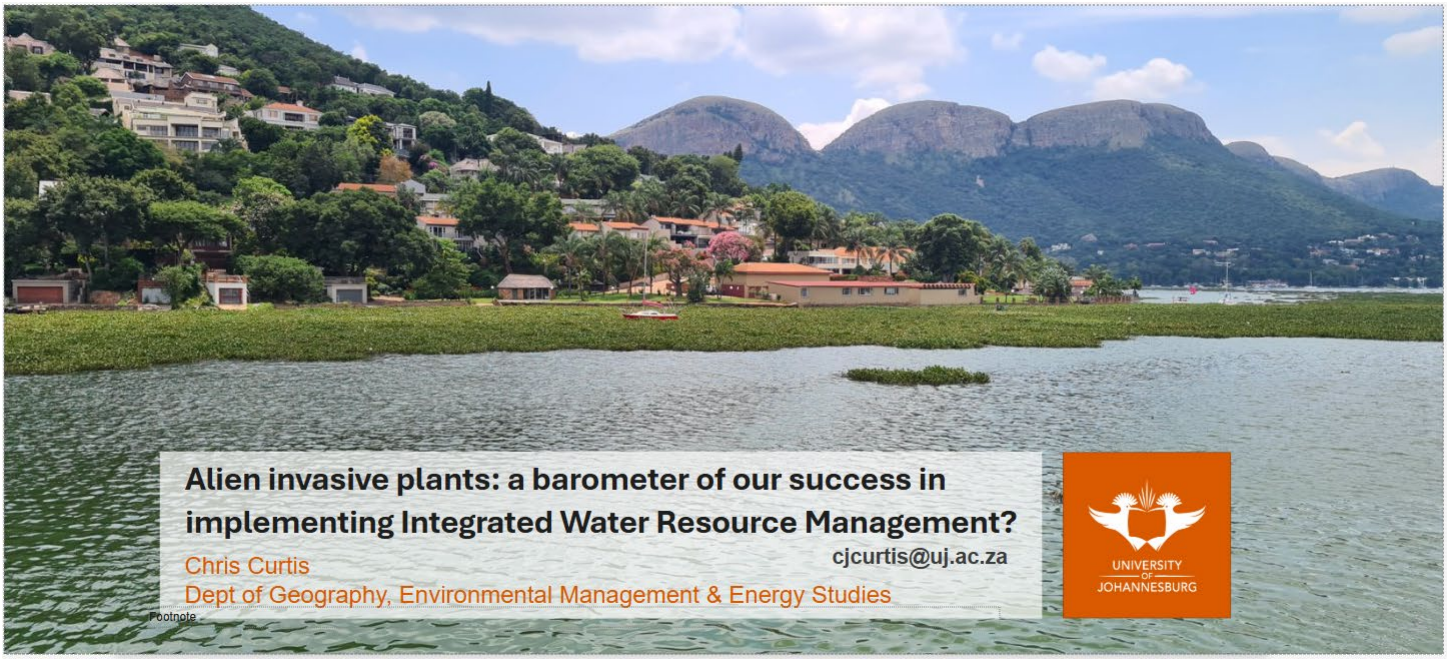
The presentation highlights South African communities' critical water-related challenges, emphasising the gap between research efforts and tangible benefits for vulnerable populations. It critiques the tendency of research to prioritise academic outputs and funding over addressing real-world issues, quoting a powerful community perspective: "We are not your lab rats." By spotlighting the urgency of equitable access to water, the presentation aligns with Nelson Mandela's sentiment that water is as precious as life itself, urging researchers to centre their work on the needs of communities.

Key water issues in South Africa are explored, such as unreliable water provision, failing water and wastewater infrastructure, and the health risks of poor hygiene practices. The presentation delves into challenges like "the last 100 meters" of water collection and storage, disproportionately

affecting vulnerable households. It further underscores the innovative approaches being implemented, including the SOURCE Hydropanel project, which provides clean water solutions, and initiatives like GloGerm training to highlight the dangers of contaminated hands in spreading waterborne diseases. These examples demonstrate practical efforts to address systemic water problems through community engagement and sustainable solutions.

The presentation concludes with a call to action for researchers to simplify and translate their findings into practical solutions for communities. Leveraging visual tools like heat maps for microbiological data and promoting sustainable handwashing techniques exemplify how research can directly empower communities. The final message challenges researchers to align their work with tangible outcomes, bridging the gap between academic knowledge and practical implementation to improve public health and ensure equitable access to water resources.

Following Prof Tobias's presentation, Dr Marlene introduced the next panel member, Prof Christopher Curtis. Prof Christopher discussed Alien invasive plants: a barometer of our success in implementing Integrated Water Resource Management.



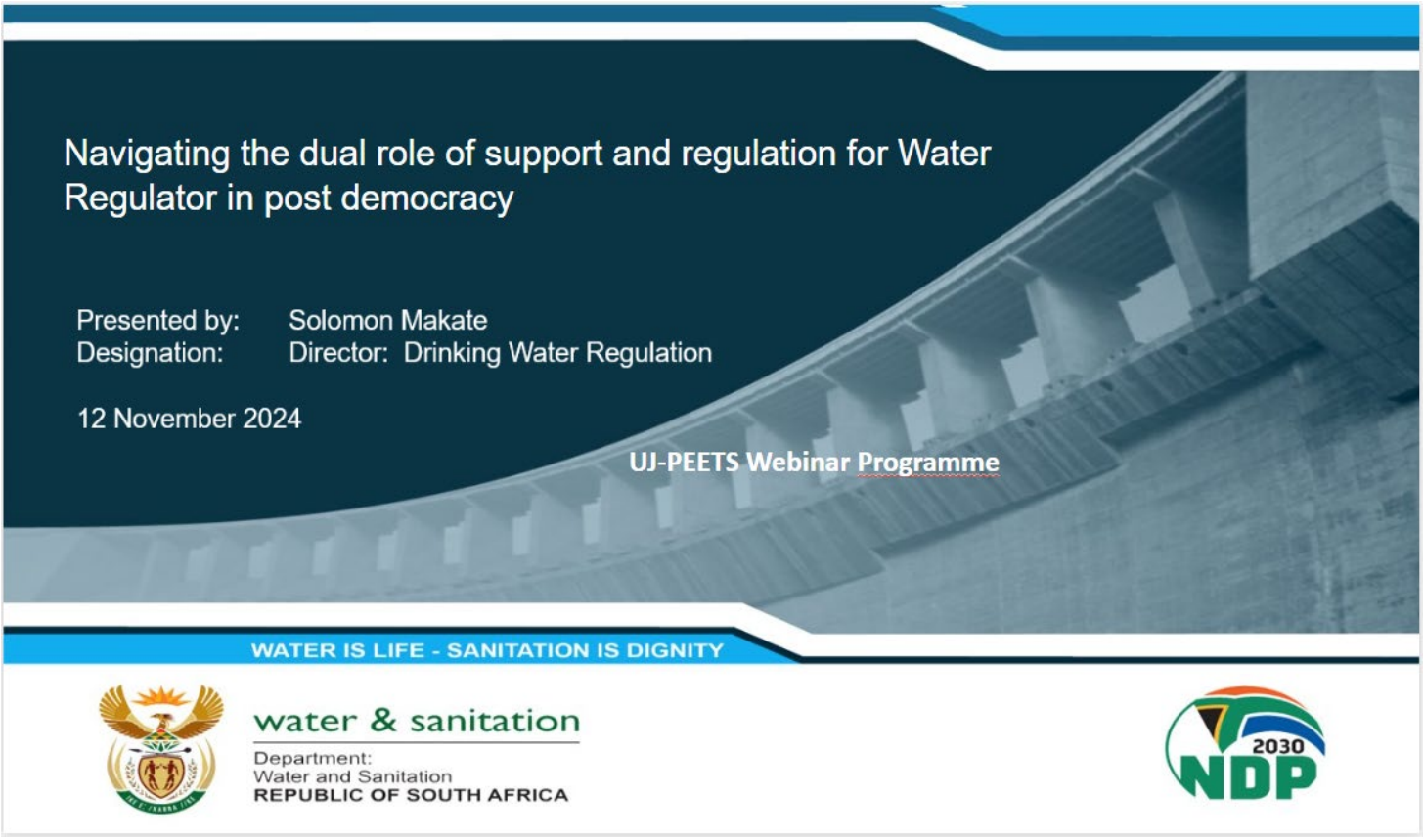
This presentation highlights the critical challenges of invasive alien plants, water resource management, and water quality issues in South Africa. The introduction emphasises alien invasive plants as indicators of the effectiveness of integrated water resource management (IWRM). Various maps and visuals underscore the alarming state of river catchments and the increasing prevalence of invasive plants, which metaphorically "clog the nation's arteries," signifying broader systemic issues in water management.

A detailed timeline of vegetation growth in Bronkhorstspruit Dam illustrates the rapid spread of invasive plants over a short period. Concurrently, Hartbeespoort Dam exemplifies the persistent difficulty in addressing such problems. The analysis draws connections between these challenges and population pressures, particularly in Gauteng, where urbanisation and infrastructure limitations exacerbate water management problems. A specific focus on nutrient inflow and outflow trends in Hartbeespoort Dam from 2010 to 2018 provides insight into increasing pollution levels, emphasising the urgency of remedial actions.

Water quality assessments along the Jukskei River reveal high contamination levels, particularly with *E. coli*, indicating failing wastewater treatment works (WWTWs), illegal sewage connections, and poor infrastructure maintenance. Visuals of informal settlements and pump stations further demonstrate systemic failures and their contribution to pollution. Attention is drawn to historical efforts and ongoing challenges, such as illegal sewage connections, vandalism, and overburdened infrastructure.

The conclusion proposes solutions rooted in proactive planning, catchment forums, and better resource management to address these systemic challenges. It advocates for tackling the causes rather than symptoms, emphasising the collective responsibility of all stakeholders. Despite the challenges, the presentation leaves room for optimism, suggesting that South Africa can effectively address its water management and invasive species issues with concerted efforts.

Following Prof Cris's presentation, Dr Marlene introduced the next panel member, Mr Solomon Makate. Mr Solomon discussed Navigating the dual role of support and regulation for the Water Regulator post-democracy.



This presentation focuses on navigating the dual role of support and regulation within South Africa's water sector, emphasising the challenges, risks, and strategies for improvement in water and sanitation services post-democracy. It begins by identifying major issues such as lack of access to safe water, failing sanitation services, and significant water losses due to ageing infrastructure, poor maintenance, and vandalism. These issues highlight the need for a regulatory framework that balances support to municipalities with compliance enforcement.

The presentation outlines five primary risks, including outdated and under-capacity infrastructure, technical skill shortages, poor financial management in municipalities, and governance issues that allow sewage discharge and inefficient water use. It emphasises the consequences of these

challenges, such as unsafe water quality and financial difficulties in maintaining water and sanitation systems. Underlying causes include inadequate staffing, maintenance budgets, and revenue collection challenges.

To address these risks, the presentation introduces mitigation strategies such as amending the Water Services Act to enforce accountability and licensing for service providers, introducing Blue Drop (BD), Green Drop (GD), and No Drop (ND) assessments to monitor compliance, and promoting private investment and advanced treatment technologies. These assessments measure system efficiency, infrastructure quality, and maintenance efforts while incentivising good practices through regulatory frameworks.

The presentation also elaborates on the support provided to municipalities, including infrastructure grants, technical assistance, capacity building, and financial management support. However, it acknowledges limitations to the effectiveness of this support, particularly when municipal leadership fails to prioritise maintenance or adhere to directives. Systemic issues like weak governance and repeated infrastructure deterioration despite grant funding are significant barriers to sustainable improvements.

Finally, the presentation underscores the importance of the BD, GD, and ND reports in providing critical data to inform interventions, improve transparency, and hold municipalities accountable. These initiatives aim to align the water sector with the country's broader developmental goals while addressing persistent service delivery and regulation challenges by focusing on compliance, resource efficiency, and infrastructure integrity.

Following Mr Solomon’s presentation, Dr Marlene thanked the panel members for their contributions and opened the question session.

Question and answer session

Q&A sessions are integral in panel discussions as they allow participants to engage directly with experts, clarifying concepts and addressing specific challenges like water management, compliance, and infrastructure gaps. These interactive discussions foster knowledge-sharing, connect diverse stakeholders, and help align solutions with real-world needs, enhancing the webinar's relevance and impact.

Question from Tiniko Salome Mthombeni: Hi, everyone. My name is Tiniko Salome Mthombeni. I'm an MSC graduate from this university and currently running an NGO named Dinugo Ms Environmental Consultants. I'm working with small-scale farmers in the eastern parts of the Limpopo area. So now I'm helping the farmer register for the water use license and other things like farm assessment activities. My question is directed to Mr Solomon Makate from DWS. We are working closely with the municipalities regarding the freshwater supplies. How can we assist DWS or come hand in hand with the municipalities in terms of helping them hire the correct personnel for the wastewater treatment and the freshwater Treatment plant. Because you'll find that at a wastewater treatment plant with a lot of water coming into the plant, there are only political people who are process controllers and under capacitated to run the plant, and always when you go there, they are either not there or attending the political meetings. So how can DWS come and work hand in hand with the municipalities so that they can rectify that kind of mistake? The community is receiving complaints about drinking water almost every day, and then the situation is not even better or improving, and it's been going on for quite some time. And then, when going to the green and blue drops, you'll find out that from the report that you get from WISA on an annual basis, the municipality is not even responding. Everything is just going grey. Everything is just going grey year in, year, and year out. So, what does that mean regarding the municipality's performance in terms of wastewater treatment rates? It seems like they're just sitting there doing political duties at the expense of their taxpayer's money.
Thank you very much.

Response Mr. Solomon - I have a short response. Thanks for the question. Regulation 3630 is meant to address that by prescribing what level of qualifications are needed at the municipality to operate the plant efficiently, and they're also the engagements that we regularly have, particularly when it comes to the assessment criteria where we indicate what type of process controller needs to operate these plans. Because this is a little bit historical, people have always perceived a process controller, often referred to as a plant operator, as a semi-skilled labour that you can get from the street and come and operate the plant without understanding that there is an element of science and engineering that is applied in water treatment. Therefore, Regulation 3630 states that you do not hire people politically just because of proximity to come and operate a plant when they have no business running it. Therefore, the regulation is meant to rectify that, and then we also facilitate training for those who are already there because now people cannot be fired, but they need to be trained so that they understand. They are at the plant in the 1st place to protect the environment but also to ensure that they supply people with adequately treated water and understand the impact of their day-to-day duties. If they don't do this, this is how it will impact the community. Thank you, chair.

Question from Jane Trembath: Good afternoon, chair, and good afternoon, everybody. I'm the chairperson of the Correspond Conservancy. We look after the Correspond Bird Sanctuary in Benoni, a wetland heavily affected by sewage and massive municipal freshwater leaks. So, my question is also for Solomon. From what I understood from your presentation, the COGTA grants to municipalities are being totally misspent or not correctly spent. In the city of Ekurhuleni, there are so many problems related to the city not maintaining the infrastructure. They have appointed contractors, and then contractors don't want to take on the jobs, and they don't want to do the work because the city hasn't paid them. So just where are the COGTA grants going? You know, these people don't get paid for an entire year, and then we sit for weeks and weeks with sewage and no fresh water. We had two decades of 1,000,000 Rand a year, with the freshwater gushing into Courseman Bird sanctuary. It never gets fixed because the municipalities just mismanaged it. I'm not pointing a finger at the officials because I believe the people on the operational side are suitably qualified, and they do want to help. Still, they don't have the resources, and the municipality is

obviously missing spending the grants. The money is just not going to go to where it's being intended to. Thank you.

Response Mr. Solomon - OK, now, thanks for the question. Yeah, that is a critical question, particularly on the governance side. You see, Metro generally does not qualify for COGTA grants, but they will qualify for what is called an SDG grant from a Department of Human settlement because the understanding is that the metros have mechanisms to actually fund themselves and then be able to operate and maintain but even though they are getting a grant in some form from human settlement. That is sometimes an unconditional grant, which we have identified as a challenge, and the risk with having an unconditional grant is that they can use it for whatever purposes they like. They can buy a municipal manager and a car and pay salaries, whereas the grant has the condition that this can only be used for water-related projects. This is where we can start winning the battle or the war because having a grant available is one thing. Still, if there is no condition on how you will spend it, it becomes a problem. You are right in saying the official, sometimes some might not be qualified, but in areas in metros, for example, they would be qualified, but the council still takes the decision. If the technical person goes to the council and says, I need so many millions to fix my instrument structure. But then the Council doesn't support them, and that technical person becomes frustrated because they've got technical know-how. They know what needs to be done, but they're not given the resources to do that. So, the one way of solving this issue is to grant as they come; they need to have conditions that they will only be earmarked for infrastructure, not anything else. So, it's a little bit of a challenge because of it. They highly rely on the Council, not necessarily on the technical, operational people who know the priorities. Thank you.

Question from Makgwale Selatola - Hi, everyone. My name is Mark, and I'm from Akapura distributions. We are one of the contractors working with the municipalities in Northwest. My question is directed at Mr. Solomon, so I'm currently an MSC candidate and working on a project regarding sludge management. I think we all know that currently, one of the significant challenges that municipal plants are facing is the lots of sludge that we have produced, so I'm just asking from

the DWS how you can guys help us to be able to classify this sludge because part of the process that I'm making is that I need to know the quality of the sludge that we are producing. Of course, I also wanted to see if it is the responsibility of the municipality or the DWS to come and help us with the sludge classification process. Thank you.

Response Mr. Solomon – Yes, we have sludge guidelines. The municipality is responsible for the classification of sludge. Remember, they can also find a way to generate revenue from their site depending on the classification of the sludge. But I think this is something that you need to do. Engage with your municipalities and your client that this sludge could be classified to determine its suitability. After selling, of course, if it is suitable for use as a fertiliser or depending on whether it needs to be fed up and officiated, you can generate some form of living that is the municipality's responsibility to classify as significant. And get it to a level that it can be used appropriately, I think, maybe if you can.

Response Dr Marlene - Thank you very much, Solomon. There are quite a few laboratories in South Africa accredited for classifying sludge according to the three classes. So yeah, the solutions are there.

Question from Nickey Janse van Rensburg: To each panelist, at PEETS our focus is on applied research and how we support industry, local municipalities, and provincial and national government. So, if we had a magic wand, what would, and could we focus our research in any specific area? Where would you think we should start? Marlene, can you also chip in on that one? Thanks.

Response Dr Jo - If it was research rather than an application question. So, instead of focusing on the uptake, I wanted to focus on a question I would like to know: how can we most quickly slash carbon emissions to zero? I would love to know what the trade-off is between the smaller picture, where we look at energy, energy efficiency maximisation and lowering our emissions from purchased fuel and look at how we minimise our emissions from the way that processes operate

and the trade-off between the two because I want to know what we need to do to achieve absolute net zero.

Response Dr Marlene - Thank you very much. Christopher, your department also deals with energy. Would you agree with Jo? Would you start from a research perspective? Applied research? Chris, what would be your thinking?

Response Prof Christopher - Thanks, Marlene, and thanks, Jo. I want to talk to you after the meeting, but yes, Gruneski has emissions from wastewater, our polluted systems, and our hypereutrophic systems, which haven't been quantified in South Africa. It's well known globally that eutrophication is increasing methane emissions, and there was a big paper published in Nature a few years ago that said that emissions from eutrophic dams could equate to 30% of global carbon emissions by the end of the century, so this is a big area we need to tackle. But returning to your question, what is the one thing we must fix? I think the next Elon Musk will be someone who finds a cheap way to remove nitrogen phosphorus from water at the river catchment scale. I'm sure thousands of chemical engineers worldwide are busy trying to solve that particular problem, but that would fix many of the issues we face, including the invasive platform. Thanks.

Response Dr Marlene - Phosphate is a limited resource that we need to recover and reuse. OK, that's the one that Chris would highlight. Prof Tobias, what is the one fix you want to raise now?

Response Prof Tobias - I would have to sort out an online monitoring system to monitor the macro role. I think everybody's seen the chemical, and we've got the system sorted by being able to monitor something online in real time. I think that would be the big one for me for microbial contamination, and I think the question we get a lot is how we do that. So, we know when an outbreak or spike occurs, and we have to treat it and not wait 18 to 72 hours for results.

Response Dr Marlene - Before handing over to you, Kousar, while we are on the online monitoring - every day, I see process controllers not only waiting for weeks to get their operating

data and qualities process unit and final quality but then not knowing what to do with the data from the lab, I would be very much in favour of a sort of a station where process controllers can phone in and say hey this is my dissolved oxygen, this is my ammonia, this is my phosphorus levels, my COD is running way high, what is the quick fix? Because often it's very, very simple solutions. Put more oxygen, bring in more return sludge, desludge your primaries a little better, and increase your disinfection ratios. Straightforward solutions to fix and optimise the processes with a team of three or four process controllers sitting in a control room and assisting process controllers out in the field. I dream of a solution like that. Kousar, what would be your input there?

Response Dr Kousar - I think, from my side, it would be data-driven implementation strategies. From my experiences, the next-generation sequencing data we're collecting would be an excellent way to optimise nature-based solutions to assess them, this data can provide the sources of pollution which can be tracked and the right methods to assist cleaners in cleaning up our polluted rivers.

Question from France Emaplatini Heritage—Thanks, doctor. Good day and good afternoon to everyone. First, just to be short, because of time, I want to recommend the UJ PEETS for what they are doing for the communities. I appreciate it. It seems like the institution is coming more to the communities rather than the government, with the government focusing on the government. From my platform, we also affiliate with Alex Water Warriors, who are experiencing similar issues. Leakages are all over. It becomes a norm after 30 years. There is no water, rainwater, or drainage. Suppose Mr. Solomon could just highlight it for us, when are they going to make at least, you know, one part? We've got tourists in our area. Tourists come into the area, but it is not clean enough to accept the tourists, and they do not drink clean water.

Response Mr. Soloman – Yes, I would like to respond because I understand the concern from the colleague, particularly around the clean drinking water provision, and the responsibility lies particularly with the water service authorities, which will be the local government. But I understand that in the eyes of the community, government is one, whether you are national,

provincial, or local. We have the same responsibility to assist communities where there is a lack of service provision. Still, in this case, the municipalities need to work hand in hand with the community.

Question from Terry Marshall - I have a question for Jo Burgess, or perhaps an answer. Marlene knows I strongly advocate for upgrading percolating filters (biofilters) with modern technology. They use a fraction of the energy consumption of the rest of the high-tech processes. In this country I have been trying for nearly 20 years to get them to adopt upgrading filters as part of the process. We can complain about phosphates and nitrates not being appropriately treated, which can be handled in the BNR plant. You save a lot of energy you take, and its simple technology; it works. Europe is using them many, many times more than they used to. And it's a process that needs serious consideration in this country. Thank you.

Response Dr Jo - Absolutely, I agree. And I think I said at some point in my 10 minutes that pumping a narration of aerobic wastewater treatment processes are the most significant greenhouse gas emitters in wastewater treatment. So I'm absolutely with you on the technology choice. And the other thing, of course, is that the ways to reverse climate change, the ways to take the industry towards net zero, we have a few more things to develop. However, most of the answers to the questions already exist, and the issue is not so much the bottleneck but the development of new methods and technologies. The bottleneck is taking up the ones that have been developed and shifting people away from the familiar stuff that they're used to doing. They know how to buy it; they know how to run it. It's not the best thing, but they're familiar with it and comfortable, so getting them to do something different is hands down, the most challenging thing.

Question from Rogers Makwinja - My name is Rodgers Makwinja from Malawi. I am a post-doctoral fellow at UJ, Geography Department, specialising in water quality and remote sensing. I agree with Jo. In my view, we have compromised the capacity of natural ecosystems such as wetlands and rivers to perform their critical ecosystem functions such as carbon sinking and purification capacity. I am also of the view that many critical ecosystem functions are not reflected

in standard economic viewpoint and, consequently, not supported by many public policies despite emerging scientific evidence. However, we need to understand that restoration of degraded ecosystems could happen at a considerable cost. We have the best examples of the world-breaking 10 billion USD restoration project of Everglades in Florida, USA. My question to Jo and the rest is: How do we balance the need to maintain the ecological integrity of our natural ecosystems under the current increased economic demands and demographic trends? Where do we miss the point?

Response Dr Jo - Your question, "How do we balance the need to maintain the ecological integrity of our natural ecosystems under the current increased economic demands and demographic trends? Where do we miss the point?" is good. There are ways for economists to assign financial values to non-tangible benefits such as clean water and clean air. We need to learn to place life-support systems higher in our scoring systems than economic benefits.

Question from Rogers Makwinja - A follow up question for Solomon. Does the DWS plan to ensure municipal grants intended for water and sanitation, are made conditional for that spending?

Response Mr. Soloman – The DWS ensures that grants are utilised for intended purposes by monitoring and overseeing projects. Over and above that where there is an indication that there is a risk of funds being misdirected, we convert those municipalities from direct transfers (schedule 5B) to indirect (Schedule 6B transfers) – this is where we appoint an Implementing agent on their behalf- it can be a WB. Funds are not transferred to the municipality, but we only pay after work has been done and verified.

Concluding remarks

The water webinar has provided a critical platform for discussing the multifaceted challenges and opportunities within South Africa's water and sanitation sector. From the insights shared, the effective management of water resources is deeply intertwined with governance, technical expertise, infrastructure maintenance, and community engagement. The discussions underscored

the urgent need for collaborative action among municipalities, national government, academia, industry, and civil society to address persistent issues such as underqualified personnel, infrastructure decay, and the misuse of financial resources.

A key theme that emerged during the session was the vital role of capacity building and technical qualifications in ensuring the efficient operation of water treatment plants. Regulation 3630, as highlighted by Mr. Solomon Makate, addresses the historical perception of process controllers as unskilled labour and emphasises the need for scientifically and technically qualified individuals to safeguard water quality. Training for existing personnel, alongside stricter hiring criteria, represents a pragmatic approach to overcoming political interference and enhancing operational effectiveness.

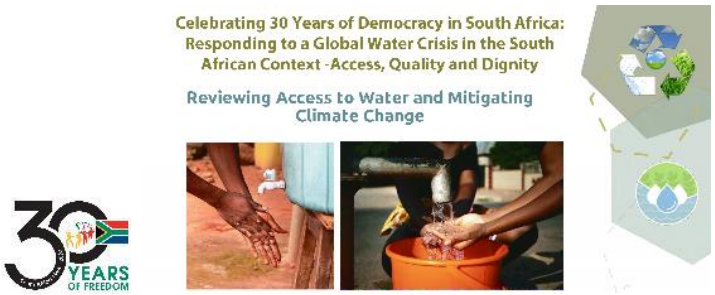
The importance of governance and financial accountability was recurring, particularly amid misspent grants and unfulfilled infrastructure needs. Attendees expressed concerns about the lack of conditionality attached to grants and the disconnect between technical recommendations and council decisions. A common call to action was the need for more targeted and conditional funding mechanisms that prioritise infrastructure improvements and water-related projects. Empowering technically qualified officials to lead these initiatives, rather than deferring to political decision-making, is essential to addressing these systemic challenges.

From a research and innovation perspective, the webinar highlighted the pressing need to bridge the gap between existing technologies and their practical application. Panellists emphasised the significance of optimising wastewater treatment processes to reduce carbon emissions, advancing online monitoring systems for real-time microbial contamination tracking, and adopting energy-efficient solutions like percolating filters. If implemented effectively, these innovations can transform water management practices while mitigating environmental impacts.

Lastly, the session underscored the pivotal role of community involvement and grassroots efforts in driving change. Whether it is NGOs assisting small-scale farmers with water use licensing or

conservancies advocating for infrastructure maintenance, the contributions of civil society cannot be overstated. Effective communication, collaboration, and data-driven implementation strategies are vital to fostering partnerships between government and local communities. As echoed by multiple participants, "government is one" in the eyes of the public, and this shared responsibility must be embraced at all levels to build trust and deliver equitable access to clean water and sanitation services.

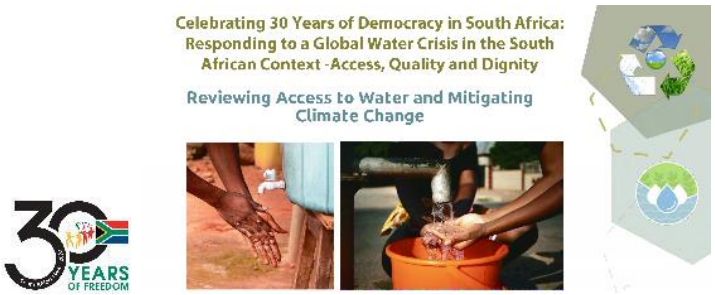
The discussions during the webinar revealed the complexity of the challenges at hand and illuminated a path forward grounded in collaboration, accountability, and innovation. As the stakeholders continue to work towards achieving the goals of the Blue, Green, and No Drop assessments, the insights shared during this event will undoubtedly serve as a guiding framework for meaningful action. Let this begin a collective effort to ensure water security, environmental sustainability, and social equity for all South Africans.



COMMENTS AND QUESTIONS FROM DELEGATES

WATER WEBINAR: 12 NOVEMBER 2024

- Gift: Moving forward may we kindly choose leaders that will recognize that they have to serve the people that they lead, who have put them in those positions...
- Gift: Rapid change, every decision we make today will influence the economy growth, conducive, safe environment for future generations. How does the next generation thrive in a country where jobs are evolving for the few and resources are limited? How can today leaders effectively guide this transition to ensure the sustainable future? We need to ask ourselves these questions. and have recommendations....
- Gift: Rooival in Hammanskraal and Giyani water projects, very embarrassing and an insult to our industry....let's take over, be in charge of all our projects...
- Matlakala, Motsi: Thank you so much Chris for an insightful presentation.
- Thabang: very indoctrinating and knowledgeable statics
- FrancisvW: Can the legal process not be shortened - eg for drunken driving you get arrested on the spot? Letters and directives t munic's take forever and in the meantime the pollution continues.
- FrancisvW: Prof Curtis : as they say in poker " I see your E. coli results and raise you one" The Rietspruit at Sebokeng this week recorded 10 947 917 E coli/100ml!!
- My name is Rodgers Makwinja from Malawi. I am a post-doctoral fellow at UJ, Geography department, specializing water quality and remote sensing. I agree with Jo. In my view, I think we have compromised capacity of natural ecosystems such as wetlands and rivers to perform their critical ecosystem functions such as carbon sinking and purification capacity. I am also of the view that many critical ecosystem functions are not reflected in standard economic view point and consequently not supported by many public policies despite emerging scientific evidence. However, what we need to understand is that restoration of degraded ecosystems could happen at a huge cost. We have the best examples of world breaking 10billion USD restoration project of Everglades in Florida, USA. My question to Jo and the rest is: How do we balance the need to maintain ecological integrity of our natural ecosystems under the current increased economic demands and demographic trends? Where do we miss the point?
    - Dr Jo Burgess reply: Makwinja, Rodgers (Unverified) - your question "How do we balance the need to maintain ecological integrity of our natural ecosystems under the current increased economic demands and demographic trends? Where do we miss the point?" is a good one.
    - 1) There are ways for economists to assign financial values to non-tangible benefits such as clean water and clean air.
    - 2) We need to learn to place life-support systems higher in our scoring systems than financial benefits.



Jo Burgess
Here's an example: www.eftec.co.uk

- Good day Marlene and panellists

  Thanks for all the informative presentations which showed the reality about clean water and climate risks as well as the causes which is mainly on infrastructure or management.

  Are the other technologies or researches which one could partner with University or researchers in developing solutions aims to treat borehole waters ?

  Because majority of rural villages water supply is sourced from boreholes by Muncipalities .

  Issues of pitoilets which have effects on groundwater. Offcoourse , I do believe every soilforms or structure has the capacity to natural clean some pollutants,however, I suspect quality of such borehole water might still be compromised on quality and risky for health.

  Thanks ,
  Dion Mphahlele
  KURIOUS INVENTIONS

Question from Nickey Janse van Resnburg: How can we support municipalities to address these causes and implement innovative solutions?
Response Jo Burgess: We can leverage private sector funding, we can educate them on proper SCM for innovation, and we can also educate the innovators so they understand what regulations their customers (the municipalities) must comply with and thus provide them with compliant proposals / quotes than could be legally accepted.