



Mr Jay Bhagwan  
Vice-President  
and  
President-Elect of  
WISA  
2004

## WRC and the WISA Conference

The exciting WISA (Water Institute of Southern Africa) Biennial Conference will be held at the Cape Town International Convention Centre from 2-6 May 2004.

Once again the WRC will play a significant role at this prestigious conference. WRC project leaders and research managers will feature prominently during the proceedings. Some of these workshops include:

- Aquasim: Software for modelling aquatic systems
- Life cycle assessment - A comprehensive tool for environmental management
- Waste Minimisation clubs
- Water Pinch Analysis: A tool for the rational management of water and effluent in an industrial complex
- Knowledge management and learning networks for water services
- Water and health microbiological research
- "Policy development and institutional arrangements for water resources management" - Research priorities
- Education and training in the water sector: The role of water research
- Membrane treatment in South Africa- Current application and future potential
- Process improvements using computational fluid dynamics- Case studies and future potential
- Benchmarking of Water Services.

Vice-President of WISA and President-Elect, from the WRC, Jay Bhagwan, said: "The Wisa Conference is a gathering of water minds and professionals, coming together to share developments and trends in water knowledge, experiences, innovations and achievements. It is an important event where these minds are revitalised (or nourished), networks are developed and knowledge is shared, all of which are vital to ensuring that the challenge of 'some for all, forever' is achievable. South Africa's and the regions water challenges are dependent on sound capacity, skills and competencies and the conference is a significant small step which contributes to the development of these needs. Of course, there is also a vibrant social component where the old meet with young, where professionals meet and share ideas and where new partnerships and water management strategies are forged. It is an African water gathering that promotes and strengthens the 'Water Family' or Fraternity.



Aerial view of the previously decommissioned trickling filters at Daspoort Sewage Works

## External Nitrification Process at Daspoort

In the external nitrification (EN) biological nutrient removal (BNR) activated sludge (AS) system the nitrification process is removed from the main BNRAS system to a fixed-media system. This has a number of technical, process and operating advantages, particularly in reducing (halving) the sludge age requirement for nitrification (from 20-25 days down to 8-10 days) while enabling near-complete nitrogen removal (denitrification) as a subsequent process stage. Moving nitrification to the fixed media system and the increased denitrification significantly reduce (by two-thirds) the oxygen requirements in ENBNRAS as compared to conventional BNRAS systems. The ENBNRAS system also requires significantly smaller settling tank surface areas, due to a reduced potential for anoxic-aerobic (AA, or low F/M) filamentous bulking. Overall, the ENBNRAS system provides opportunities for substantial system intensification at decreased capital and operating costs.

The performance of the ENBNRAS system was successfully demonstrated at lab-scale in WRC Project No. 970 and is now being tested at full-scale in a joint research contract between the University of Cape Town, the City of Tshwane and the Water Research Commission. One third of the Daspoort Watercare Works in Central Pretoria was modified to the ENBNRAS system configuration in 2003, and is currently in the start-up phase of operation. The aims are to evaluate BNR in the ENBNRAS system, to assess the performance of the nitrifying trickling filter and internal settling tanks, and to evaluate the economic implications at full-scale. The initial design and preliminary results will be reported on at WISA 2004 in May.

## Capacity-Building @ the WRC

The project "Effective Local Management of Water Resources with Reference to the Middle and Lower Orange River" (Water Resource Management KSA) yielded two students graduating from the University of the Free State. The two students, Ms Jacinta Mahlaha and Mr Emmanuel Gakpo, come from previously disadvantaged backgrounds.

Ms Mahlaha is currently employed by the Free State Province, Department of Agriculture. Mr Gakpo obtained his MSc Agric degree with distinction. Furthermore, he won the prize for the best MSc dissertation, an award presented to him by the Agricultural Economics Association of South Africa in 2003. His dissertation dealt with "Alternative institutional arrangements towards optimal water allocation" in South Africa.

Mr Gakpo states under the "Acknowledgements" section of his dissertation, "My gratitude first goes to the Water Research Commission (WRC) for fully financing this project and appointing a vibrant steering committee to see the project through successfully."

## Newsletter of the Water Research Commission

### In This Edition

- Are you Suggesting...? - p 1
- Non-Solicited Research Proposals Accepted for 2004 - p 2
- Launch of Knowledge Review - p 2
- A People's Person - p 2
- What's New - p 3
- WRC and the WISA Conference - p 4
- Capacity-Building @ the WRC - p 4
- External Nitrification Process at Daspoort - p 4



## Are you Suggesting...?

Seventeen years ago, an innovative second-year BSc Agriculture student at the University of Fort Hare had a brilliant idea regarding the improvement of the performance of his classmates. He had no idea as to the extent to which such a suggestion would impact on the lives of so many students, including his very own. It all began when the Dean of the Faculty of Agriculture, Prof Tim Bembridge, invited suggestions from students about boosting their morale.

An enterprising student, Sizwe Mkhize, suggested that the university consider motivating students from the first day that they came to university. Motivation meant that instead of one award being given to one student at the "end-of-stay", several awards could be given every year to industrious students during each phase of study towards the B Agric as well as the BSc Agric degrees.

When the Faculty finally decided to approve Sizwe's proposal the following year, he was the first one to receive an award as Best Second Year BSc Agric student in 1987. In fact, Sizwe was the best BSc Agric student during his third and fourth years of study, and the best overall student in 1989, the year in which he graduated. Coincidentally, he was the Chairman of the Agricultural Students Association at the time he received his first award, and he was expected to make a speech on behalf of the students.

In 2003, seventeen years later, Dr Sizwe Mkhize was invited to Fort Hare to make the same speech. This time, however, as guest speaker. In the interim, the young Sizwe Mkhize had grown to Dr Sizwe Mkhize who was proud to visit his Alma Mater, and to share his successes and experience with the best students of Agriculture at the University of Fort Hare.

In his speech, Dr Mkhize challenged the young agriculturists to think big, and to work hard towards achieving their dreams. He emphasized that study opportunities for hard-working agricultural students were unlimited. Sizwe informed students about the WRC, the Department of Agriculture and IWMI, and the fact that, although the WRC did not give bursaries to students, every hard-working young scientist could contact the WRC for possible linkages in water-related research. This, in his view, was much more than a bursary since a student could get exposure while earning a living from project resources.

Sizwe joined the WRC on 1 October 2000 as a Research Manager. When the WRC underwent a process of re-structuring, he retained his position as Research Manager, but he was also appointed Head of the Cross-Cutting Domain, Water and Society.

It is unfortunate that the WRC will lose Sizwe to the National Department of Agriculture: He has accepted a post as Assistant Director-General as at 1 November 2003. Sizwe has made a great contribution by expanding the knowledge base that exists at the WRC. His achievements include projects related to rainwater harvesting and the use of wetting front detectors for irrigation scheduling. As a committed person to the Domain, Water and Society, Sizwe has been involved in a major project at Duncan Village (an informal settlement) which investigated water-related factors that lead to unhealthy conditions of living as well as numerous poverty alleviation projects. It is evident that Sizwe's research stature is firmly rooted from his suggestion, and the implementation thereof, seventeen years ago.

Sizwe, the WRC thanks you for your contribution and wishes you well in your new position. We have no doubt that you will continue to grow in your new work environment.



From left to right: Dr Sizwe Mkhize (WRC); Mr Marco Brutsch (University of Fort Hare) and Mr Tiyani Mongwe (Land Bank)



A young Sizwe Mkhize delivering his address to students at the University of Fort Hare



## Non-Solicited Research Proposals Accepted for 2004

The WRC recently called for solicited and non-solicited research proposals. In response to the latter, 227 proposals were received, of which 183 were deemed suitable for further consideration by reviewers.

The assistance of a total of approximately 280 reviewers facilitated the smooth running of the entire process. Most reviewers reviewed more than 1 proposal. A staggering 543 reviews were completed. This translates to approximately 2.97 reviewers per proposal. The WRC is grateful to all the reviewers who went about their work with great professionalism and helped to make this process an objective and effective one.

This rigorous process has gone a long way towards ensuring that projects of a high calibre were selected and that water research priorities are being addressed in a manner which will meet the changing needs of society

## Launch of Knowledge Review

On 4 December 2003 the WRC launched its Knowledge Review for the 2002-2003 financial year. This document showcased the research outputs for the financial year.

The day saw the WRC abuzz with an array of posters, banners, videos and models. Videos included film clips on estuaries, water harvesting and shallow sewers. Models included a model of fog collection and membranes.

Guests included WRC staff, researchers, scientists, science council CEOs, representatives from Government departments, university academic staff and students.

If you would like a copy of the Knowledge Review, contact Ingrid Buchan on 012-3300340; e-mail: [ingridb@wrc.org.za](mailto:ingridb@wrc.org.za). The document can also be downloaded from the WRC website, [www.wrc.org.za](http://www.wrc.org.za)

From left to right: Rivka Kfir (CEO, WRC); Prof Kasan (Chairperson, WRC Board) and Ingrid Buchan (WRC)



Reshmili hails from Kwadukuza (previously known as Stanger). She studied at the University of Durban-Westville where she completed her BA degree in 1997. She then enrolled for an Honours degree (Geography and Environmental Studies) at UNISA, which she completed in 1999. In 2000 Reshmili completed an Advanced Diploma in Human Resources followed by a Post Graduate Diploma in Business Management (University of Natal). She has recently completed her MBA at the University of Natal.

Reshmili's career began at Sappi (Ktaft Division) in 2002. She joined the WRC on 8 December 2003. This ambitious young lady plans to implement many innovative ideas at the WRC: her plans include beefing up the security, time management and the occupational, health and safety measures at the WRC. Such daunting tasks pose a challenge to Reshmili, who plays a pivotal role in supporting Executive in effectively managing their most important resource - their employees. "I plan on creating new structures to ensure that the WRC machinery runs smoothly. I shall also ensure that the WRC is aligned to developments within South Africa," says this energetic professional.

When she is not dwelling on HR matters, Reshmili relaxes by spending quality time with her dogs or watching DVDs. She finds the work atmosphere at the WRC professional and stimulating. "I must thank the WRC staff for making me feel most welcome." Reshmili, the WRC welcomes you into its family circle and we look forward to working with you.

## A People's Person

Reshmili's winning smile and cordial demeanour are indicative of her passion for working with people. It comes as no surprise that this young lady was chosen as Administrative Officer at the WRC.

## What's New

### Report No 1139/1/03 (Business Partners in Development) Built to fly? Public-private partnership in providing water services to poor communities

This project was characterised by a partnership with each partner contributing funding and decisions being made on a cooperative basis. A major part of the project involved synchronizing technical and social activities towards the developmental goal of all-round provision of water services combined with health and hygiene for the urban poor. The processes were exploratory and orientated to delivery. There has been a high level of delivery with 24 projects completed in Pietermaritzburg and 22 in Durban in a wide-ranging field including water loss management, free water, customer management, and health and hygiene awareness. The partnership also initiated a large number of projects in upgrading of services, GIS networks, education and awareness, water loss management and anaerobic baffle reactors.

### Report No 1103/1/03 (Rhodes University) Development of a membrane photobioreactor for the study of microcystin production by cyanobacteria

The project investigated factors that affect toxin production, bacterial immobilisation and methods of toxin extraction from cyanobacterial biofilm; the development of a suitable membrane module and a method to immobilise the bacteria and to assess toxin production in the biofilm. A significant finding of the project was that, although toxin production was rapid using this system, the biomass development and total toxin produced was low. Considerable new information was gleaned on the physiology of microcystin production using a membrane bioreactor as a research tool.

### Report No TT 211/03 (University of Cape Town) The measurement and reduction of urban litter entering stormwater drainage systems

The report explores the source, type and amount of litter reaching the drainage systems from the different types of urban catchments and aims at measuring the effectiveness of different catchment-based litter management options. Nine pilot catchments in and around Cape Town were studied. The main contributors to litter in drainage systems were construction rubble, plastic items, sand (especially when combined with plastic items). It was found that sensitising communities, effective street sweeping and the use of grids over catchpit openings significantly decreased the amount of litter in stormwater drains.

### Report No TT 216/03 (Mvula Trust) Making water work for villages. Community-Managed water service provision

The task of quality water provision is the mandate of municipalities. This workbook is designed to assist municipalities to explore ways of managing the challenge of quality water provision to villages. This assistance is covered in two parts: Part 1 introduces community-managed water schemes and examines the contribution that community-based water service providers can make to improve the functioning of water service provision. In this part a range of experiences of communities and municipalities in implementing such schemes are highlighted. Part 2 deals with how to establish and support community-managed water schemes and focuses on the practicalities of establishing community-based operations and maintenance of water provision in villages. The handbook provides the user with practical steps to ensure sustainable community management of schemes.

### Report No 1055/1/03 (University of the Free State) On-site laboratory investigations of spoils in opencast collieries and the development of acid-base accounting procedures

and  
Report No 1055/2/03 (University of the Free State)  
Acid-base: Accounting, techniques and evaluation (ABATE): Recommended methods for conducting and interpreting analytical geochemical assessments at opencast collieries in South Africa  
These reports outline the research conducted on acid mine drainage and the standardisation of methodologies to be followed to quantify the potential and magnitude of acid mine drainage under South African opencast mining conditions. An easy-to-use spreadsheet tool, ABACUS, has been developed to standardise the interpretation of static acid-base accounting data and, where the suggested sampling methodology has been followed, to provide a method for extrapolation to the field through volume-weighted techniques.

### Report No 868/1/03 (University of Cape Town) Modelling variability in the south west Indian Ocean and its influence on South Africa's climate

Atmospheric modelling confirmed that the South West Indian Ocean is an important source of moisture for seasonal rainfall over southern Africa, when warmer than average sea surface temperature may have a significant influence on extreme weather evolution and tends to lead to drier rainfall seasons over the eastern half of South Africa when cooler than average. Ocean modelling confirmed the highly variable nature of the southern Agulhas Current region on meso-, seasonal and interannual scales. Newly-generated information may be particularly useful for seasonal forecasting interpretation and development and for guiding future studies.

### Report No TT 174/02 (CSIR, Pretoria) Guidelines for *Legionella* levels in water. A code of practice

This guideline are intended for use in assisting in the maintenance of industrial and community buildings, hospitals and frail-care centres that use cooling water in cooling towers, misters, artesian drills, car washes, showerheads, whirlpool systems, dental hand drills and decorative fountains. The guideline aims to create an awareness of the *modus operandi* of *Legionella* as a pathogen and the associated human health risks, in order to assist in the development and interpretation of sampling programmes, to identify *Legionella* detection procedures, to effectively prevent and control *Legionella* levels in water and to establish monitoring and maintenance measures. The guidelines are intended for use in South Africa.

### Report No TT 210/03 (Lenahan Consulting) An assessment of the trickle feed system as a tool for implementing the free basic water policy

This report will assist role players to make informed decisions with respect to the implementation of the Trickle Feed System to provide a free basic water supply of a high level of service to rural communities. Building capacity in previously disadvantaged individuals and organizations was a significant component of monitoring and evaluation undertaken in this project. Several urban and rural case studies investigated in this research project indicate that this system is successful in the delivery of a consistent, high level of service.

### Report No KV 141/03 (Ninham Shand, University of Stellenbosch) Impact on invasive alien vegetation on dam yields

This study sought to provide preliminary information relating to the link between clearing programmes and potential increases in utilisable water in rivers. The objective was to produce first approximations of the impacts of invasions by alien plant species on the assurance of supply from typical dams in typical catchments. This study has shown that it is feasible to estimate the potential streamflow reduction impacts on utilisable water in South African river systems for which reasonably reliable data bases on invasion patterns exist. Furthermore, a workable approach has been found to combine empirical long-term streamflow reduction prediction models with monthly time series rainfall-runoff catchment modelling.

### Report No 1173/1/03 (University of the Free State) Purification of wastewater with crown ethers anchored on a solid support

A new technique, which is potentially useful for waste water purification from South African mines, was developed. It involved the identification of a suitable ligand that can bind a target metallic cation, in this case the sodium cation, strongly but reversibly. The best sodium cation scavenging devices were found to be those that had polymeric linking groups between solid support and crown ether. Systems that allowed dendrimer technology of the third order to exponentially increase the loading capacity of crown ethers on the solid support were especially effective. When this technology becomes fully operational, greatly improved opportunities will be created.

### Other new WRC reports:

1064/1/03 A decision support system for rehabilitation and management of Riparian systems. (University of Natal)  
KV 144/03 Development of river rehabilitation in Australia: Lessons for South Africa.  
TT 208/03 Hydrogeology of Groundwater: Region 19 Lowveld.  
TT 209/03 Hydrogeology of Groundwater: Region 7 Polokwane/Pietersburg Palteau.  
859/1/03 The reliability of small spring water supply systems for community water supply projects (CSIR and DWAF)  
1101/1/03 Determining the instream flow requirement monitoring protocol (Rhodes University)

Reports can be ordered at [orders@wrc.org.za](mailto:orders@wrc.org.za)