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Newsletter of the Water Research Commission

In This Edition



The Bux does not stop here!

When Faizal Bux was an impressionable school boy, he showed a keen interest in environmental issues. Today, as a researcher in the water sector, he is following his dream by focusing his research efforts on areas which contribute to providing South Africans with a clean and safe water environment.

Prof Bux attended the then University of Durban-Westville where he completed his BSc and BSc (Hons) degrees. He obtained his MTech degree at Technikon Natal and completed his doctoral qualification in 2004. He was appointed Associate Professor in 2004.

He began his career as a Senior Lab Assistant in the Department of Microbiology (University of Durban-Westville) in 1988. His initial experience as a researcher commenced in 1990 when he worked on a WRC project focusing on heavy metal bioremediation. He then joined the Centre for Water and Wastewater Technology at the Technikon Natal (now Durban Institute of Technology), where he served as Projects Manager and as Director from 1999. Faizal and Prof Kasan (Rand Water) initiated the Centre for Water and Wastewater Technology. Faizal says "I continue to lead the activity area comprising of a multi-disciplinary team of 4 researchers and serve as Activity Leader in addition to lecturing courses in Environmental Biotechnology. The area of research was selected in consultation with role players and to satisfy the regional and national water research needs while focusing on research that is primarily locally relevant and globally competitive."

Faizal's primary research focus is on bioremediation of industrial effluents containing pollutants such as heavy metals (from the metal finishing industry) and oils (from edible oil processing). Conventional methods for treating heavy metal effluents to municipal discharge standards are generally expensive. Various biosorption technologies for treating electroplating effluents, initially using waste activated sludge and later also commercially available biosorbents, were developed and assessed with the aim of providing a suitable alternative involving cheaper and cleaner technology The products of the research were presented in a technical report (WRC 688/1/97), and designs for pilot plant development and up-scaling were presented to industry. Similarly, inadequate effluent treatment in the edible oil industry has created problems at wastewater works and pollution of river sources. Research resulted in the development of a combined pre-treatment and biological process that resulted in a final effluent quality that easily satisfied municipal discharge standards.

Another interest area of Faizal's is the use of novel molecular/genetic techniques for determining the microbial communities and activities of heterotrophic bacteria in activated sludge, and he says "the most challenging aspect of my research career was trying to make a meaningful contribution to activated sludge research (traditionally the domain of civil engineers) as a microbiologist and adopt a collaborative working relationship; to this end much was achieved." Co-authored research outputs in this area were published in a technical report (WRC 688/1/97) and were well received by the global research community at an International Congress in Japan and International Water Association Symposium in Paris.

Faizal has received two prestigious awards: the Vice Chancellor's award in recognition of being an NRF-rated (C-rating) researcher (2005); he also received the Technikon Natal medal of merit for outstanding contribution to the field of research (1997).

Prof Bux serves many roles: project leader for 4 WRC projects; a member of the Durban Chamber of Commerce Environmental Committee; invited to serve as a scientific advisor to NGOs; a reviewer of 9 international journals; supervisor of 24 completed and current Masters and doctoral students.

How does this eminent scientist achieve all of this? "I value the support of my wonderful family and the hard work of my postgraduate students. I must also acknowledge the role of my mentor, Prof HC Kasan (current Chairperson of the WRC Board), who was an outstanding role model and a true mentor during the early stages of my career. They collectively provided me with inspiration that spurred me on to achieve my goals. I intend to continue to focus my efforts to conducting relevant and quality research with the aim of making a meaningful contribution to satisfy the water research needs of South Africa."

Greg Steenveld, WRC Research Manager for many of Faizal's projects and who also serves on the Advisory Committee for the Durban Institute of Technology, says, "Prof Bux, the WRC values you as a researcher and student mentor, and we look forward to a long and fruitful relationship with you".

Welcome Dr Stanley Liphadzi

On 1 April 2005 Dr Stanley Liphadzi joined the WRC as a Research Manager of KSA 2. Stanley first worked as a training officer in Venda. He then joined the University of Venda in June 1994 as a crop science lecturer. His achievements are infinite: He supervised more than 30 senior students; published two innovative papers on multicropping systems; led the research and capacity-building programme funded by the NRF and established a food security project for the blind farmers at Rivoi, Limpopo Province. Whilst at the university, he completed his MSc degree at the University of Pretoria.

In 1999 Stanley got a Fullbright Scholarship to study towards a PhD (Agronomy) in the USA, a qualification that he attained in 2002. He returned to South Africa where he was appointed by the ARC as a manager for grain and industrial crops.

Whilst he was at the ARC, Stanley made a significant impact on this organization: He was the leader in the development of the ARC's technology transfer strategy; he was the leader of the R7 Million project on the establishment of the biodiesel technology incubator in Limpopo Province; He was responsible for facilitating the signing of more than 10 MOUs by and between the ARC and its stakeholders and he began the process of fostering relationships between the ARC and the Provinces- until he was snapped up by the WRC! The WRC will surely benefit from such intellectual capital.

Stanley is already at home at the WRC and perceives WRC staff as being "friendly and accommodating". This enterprising 30-something young man is married to Konanani and they have twins: 5-year old Tshifhwa (daughter) and Phathutshedzo (son). When he is not preoccupied with science, his flair for soccer (both as a player and a spectator) as well as his artistic dimension (an avid music performer and listener) come to the fore.

Stanley, the WRC welcomes and you and we hope that your stay will be a long and rewarding one.

The WRC hosts the National Press Club

On 28 April the WRC hosted the National Press Club at the Marumati building. The event consisted of a display session (posters and videos) of WRC projects as well as a briefing by the WRC CEO, Dr Rivka Kfir. The briefing generated lots of interest and many questions were raised. The resultant discussion was stimulating and thought-provoking.

Left: *Dr Rivka Kfir delivering her presentation*

Left: *Ben Rootman, Chairman of the Press Club*

Below: *Meiring du Plessis answering questions*

Top*: Zagry Scholtz assisting with the raffle*

The WRC at the Tshwane Business Week

The City of Tshwane held its Business Week Conference in Pretoria on 9-10 May. The conference focused on the vision of the city as well as initiatives to attract investment. It was a a great opportunity to establish links with local and provincial Government officials.

What's New

Report No 1043/1/04 (Contractor: University of the Free State)
Development of models for economic evaluation of the integrated management of the quantity and quality of irrigation water within river catchments

The main objective of this research was to develop a spatial decision-support system capable of quantifying economic environmental tradeoffs of alternative NPS pollution abatement instruments. The research was conducted in the Gamtoos river catchment. The drainage area of the 70 km long Gamtoos River, which is surrounded by the Baviaanskloof Mountains, constitutes an area of 1 357 km^2. The Soil and Water Assessment Tool (SWAT) was selected to simulate inputs for the spatial optimisation models that were used to quantify the economic and environmental tradeoffs. Results from the research not only showed that the developed procedures were suitable to quantify economic environmental tradeoffs necessary for NPS pollution abatement policy, but also suggest important policy implications.

Report No 1381/1/04 (Contractor: Nemai Consulting)
A review of public participation in the rural water and sanitation setting

This document explores the nature of public participation. Various definitions of public participation are analysed and discussed with the objective of contextualising what public participation entails in rural water supply and sanitation. The guideline document aims at assisting project implementers and service providers to facilitate effective public participation in rural water supply and sanitation projects. However, the participatory review provided in the document should not be regarded as prescriptive guidelines to project implementers intending to include the public in rural water supply projects. Therefore, aspects highlighted in the document could be modified by project implementers to suit particular circumstances. The literature study revealed that for community participation, it is important for project implementers to take people's aspirations, needs and perceptions into consideration when planning for community water supply and sanitation projects. Thus, public participation should help develop local capacities, which will be important if the project is to be sustainable.

Report No 920/1/03 (Contractor: Rand Water)
Evaluation of a filter backwash recovery plant to establish guidelines for design and future operation

The aims of the project were to establish guidelines for the design and future operation of filter washwater recovery plants with emphasis on removal of suspended matter, pathogenic bacteria and protozoa and taste and odour causing compounds and algae; and to establish design, treatment requirements and operational procedures to produce water of potable quality. The suspended solids in the spent filter backwash were effectively reduced from 352 NTU to 0.18 NTU in the filtered water. Water with turbidity of between 5 and 10 NTU were fed onto filters and a filtered water turbidity of less than 0.3 NTU was consistently produced. The standard plate count of the filtered water was slightly higher than counts observed in the filtered water of the main treatment process at Rand Water. Very high invertebrate numbers were detected in the spent filter backwash at times. Invertebrate numbers in the filter effluent exceeded the Rand Water recommended limit but complied with the maximum permissible limit. The chlorine demand of the filtered water was the same as in filtered water from the main treatment process. The average total organic carbon concentration of the filtered water was determined to be 3.7 mg/ℓ.

Report No 1218/1/03 (Contractor: CSIR)
The use of isotope techniques to define the riparian zone in commercially afforested catchments

The study used trees as integrators of the edaphic conditions in the vicinity of their roots. Using this approach, the objective was to explore the physical and chemical characteristics of wood that relate to water uptake of the trees and to use these to demonstrate reduced water stress associated with riparian water access. The spatial differentiation of characteristics that proxy water use was combined with the established criteria for defining the riparian habitat to give a more precise measure of the water-use or savings associated with the protection of the riparian habitat. This study is a pilot project focusing on the use of isotope and related techniques to determine water-use strategies of trees.

Report No 899/1/04 (Contractor: Envirogreen)
The effect of the chemical properties of tailings and water applications on the establishment of a vegetative cover on gold tailings dams

This project was undertaken to establish which of the commonly used rehabilitation methods from the two main approaches for revegetating gold tailings, produced the most sustainable vegetation cover at the end of the rehabilitation period and to quantify the water needed for the different rehabilitation methods. Prior to this project the proponents of the different approaches to gold tailing rehabilitation practically had no contact with each other. Through their involvement in this project and on the Steering Committee this changed dramatically and they now even collaborate with each other. The project also helped to remove much of the mystique from the revegetation practices. This holds the promise that future investigations will be based on scientific merit.

Report No 944/1/04 (Contractor: ARC)
Screening of cowpea, bambara groundnut and Amaranthus germplasm for drought tolerance and testing of the selected plant material in participation with targeted communities

The main objective of this study was to evaluate the drought tolerance of vegetable crops grown in environments where the crop yields are influenced by limited water supply. Germplasm of cowpea, bambara groundnut and Amaranthus germplasm was collected by personnel of the University of Zululand and the Sustainable Rural Livelihood (SRL) unit of ARC-Roodeplaat. A multidisciplinary approach was followed to measure the effect of drought stress on the physiology, biochemical and morphology of these plants, and to identify mechanisms that allow the plants to survive severe drought stress. The information obtained through this study contributes towards a better understanding of the physiological and morphological basis of drought tolerance in indigenous crops. The techniques selected were able to distinguish between drought tolerance in the different genotypes tested.

Report No 1190/1/04 (Contractor: MBB Consulting Engineers)
Electric power supply measurement as an alternative to measure flow-rates of hydraulic pumps

The objective of this project is to develop a procedure, or method, by which water pumped with an electrically driven pump, can be metered indirectly. Various alternative procedures were tried at the beginning of this project. Existing testing facilities were also visited. Eventually most of the work for the testing phase was done in the laboratory of the Cape Technikon, using pumping equipment made available by the Department of Agriculture, Western Cape. Five test sites were identified for field tests. From the readings of all the tests done (laboratory and field tests) it is evident that there is a good correlation between power used by the pump and the flow-rate of the pump. What is more important is that this correlation is measurable and also that repetitive measurements give similar results. These findings enabled the project team to design the first prototype meter. The monitoring done with the prototype meter proved that the design meets the basic requirements for its application.

Report No 1296/1/04 (Contractor: Marketing Surveys and Statistical Analysis)
Payment strategies and price elasticity of demand for water for different income groups in three selected urban areas

The project sought to compare different water payment strategies and investigate the attitudes and behaviour of low-, mid- and high-income level residential water users as a consequence of these payment strategies; to determine the price elasticity of demand for water of low-, mid- and high-income groups, to enable effective water demand management to be put in place in the selected areas. Surveys were conducted by face-to-face interviews among samples of low-, medium- and high-income population groups of residential water users in three newly created metropoles: Tshwane, Ethekwini and the city of Cape Town. From the PPST experiment three issues emerged as being important with respect to water payment strategy policy formulation: water accounts, payment options, consumer's water usage and their estimation of that water usage. From the results of the CV experiment certain tariff policies were suggested and also some advice was offered on water system design and the tariff of water. The design of water resource developments, the price elasticities of demand found from the CV experiment could be used by designers to use investment funds efficiently by means of staged system design, thus using the funds available in the most efficient manner

Reports can be ordered at orders@wrc.org.za

The WRC @ Ramsar

The thirteenth session of the United Nations Commission on Sustainable Development (CSD-13) took place from 11 to 22 April 2005 at the UN headquarters in New York, USA. The discussions focused on "policies and options to expedite implementation of commitments in the areas of water, sanitation and human settlements, as contained in Agenda 21, the Programme for the Further Implementation of Agenda 21, the Johannesburg Plan of Implementation and the Millennium Declaration".

Dr Heather MacKay, Research Manager and Head of Crosscutting Domain: Water and the Environment at the WRC, and Vice-Chair of Ramsar's Scientific and Technical Review Panel (STRP), presented the Convention's framework on water resource management.

For more information visit http://www.ramsar.org/mtg_csd13_1.htm

Dr Heather MacKay of the WRC

The WRC @ the SABC Career Faire, Pretoria

The SABC Career Faire was held in Pretoria (Tshwane Events Centre) on 10-12 May. The WRC participated in this event and distributed the career guide *Water @ Work*.

Una Wium (Co-ordinator) and Agnes Molubi (Group Assistant), both from KSA 2, manned the exhibition stand with staff of the Department of Water Affairs & Forestry (DWAF). They promoted the WRC's capacity-building drive by distributing the guides to learners and briefing them about the structure and dynamics of *Water @ Work* and bursaries available from DWAF. Many learners, especially those from historically disadvantaged backgrounds, benefited from the experience. Una and Agnes also enjoyed meeting, Mr Aaron Moloisi, the popular presenter of Take 5, an SABC TV youth programme.

Aaron Moloisi flanked by Una Wium and Agnes Molubi at the SABC Career faire

Agnes Molubi answers learners' questions

Learners at the Zoolake Water Festival

The WRC @ the Johannesburg Water Festival

On 21-27 April 2005 Johannesburg Water held its Festival of Water at Johannesburg Zoo Lake. The event attracted a number of learners, educators and the public at large. The focus was on water conservation and awareness.

The WRC participated in this event. Various publications were distributed including *The Water Wheel; Water @ Work: A Career Guide; Some for All, Forever; Your Water Rights* and other such publications. Learners especially were receptive to the WRC as South Africa's water knowledge hub.

The WRC @ site visits in the Drakensberg

On 6 May the WRC formed part of the site visit to two sites in the Drakensberg. Dr Colin Everson was the project leader who co-ordinated a Farmers' Day to share knowledge about research into fodder production, especially during the winter months. The project commenced 10 years ago and was supported by the WRC. Mr Bongi Mthembu oversees the project as part of his PhD study – yet another example of the WRC's capacity-building drive, especially among historically disadvantaged individuals. The site was Mr Mbhele's farm. Mr Mbhele expressed his gratitude to the WRC for assisting him as a dairy farmer. An outstanding result was that milk production on his farm increased from 15 litres a day to over 100 litres a day.

The second site visit was the neighbouring Okhombe Catchment where members from the Okhombe Monitoring Group (OMG) explained various land rehabilitation techniques: runoff plots, Morgan Splash Cups, Splash boards and donga rehabilitation.

An SABC TV crew was present and the project highlights were captured for television broadcast.

Mr Mbhele and his prize bull