amanzi
Newsletter of the Water Research Commission
June 2003



WATER RESEARCH COMMISSION (WRC) CALL FOR RESEARCH PROPOSALS (2004/2005)

The WRC is calling for the submission of proposals for non-solicited research in the three Key Strategic Areas:

- Water Resource Management
- Water-linked Ecosystems
- Water Use and Waste Management

Deadline for receipt of proposals: 15 July 2003.

For detailed guidelines regarding proposal submission and access to the on-line submission form please consult the WRC website **www.wrc.org.za** or contact Zagry Scholtz:
E-mail zagry@wrc.org.za; Tel 012 330 0340

The *Amanzi* Survey

A very big thank you to all those who provided me with valuable feedback. Common concerns were the phasing out of the *SA Waterbulletin* and the need for two publications in its stead. I feel that I must clarify these issues.

The WRC's new strategic direction places a much-enhanced emphasis on comprehensively informing its stakeholders. Therefore, the newsletter *Amanzi*, launched by the Public Relations/ Communications Division provides news about new WRC products and showcases activities of the WRC as well as prominent researchers in the water sector. The Water-Centred Knowledge KSA complements this initiative with the new publication, *The Water Wheel*, which aims to contribute to public understanding and appreciation of water-related science and technology issues.

With these objectives in mind, you, the readers, are invited to provide continuing feedback on the extent to which we are achieving them.

Mr Kevin Pietersen
Director: Water resource Management

Mr Renias Dube
Research Manager

Dr Heather McKay
Research Manager

Ms Charmaine Smit
Co-ordinator

Ms Ralda de Wet
Group Assistant

Key Strategic Area (KSA): Water Resource Management

This KSA focuses on:

- Principles and objectives of the National Water Act (NWA) of 1998
- Providing guidance for policy implementation and development of policy instruments
- Addressing the potential negative impact of global climate change on water resource management

Primary objective

To ensure that water resources are protected, utilised, developed, conserved and managed to achieve environmental, social and economic sustainability. Sustainable water resource management requires a holistic approach that balances competing demands of the different user groups.

Secondary objectives

- To improve policy for promoting equitable, efficient and sustainable conservation and allocation of water resources among competing needs
- To develop a systems approach, supported by necessary management tools and institutions, to integrate environmental, economic and social issues within a catchment area.
- To provide a scientific explanation and adequate quantitative understanding of the soil-water balance dynamics
- To acquire adequate understanding of atmospheric processes and develop appropriate atmosphere-based technologies needed for the satisfactory assessment, management and augmentation of South Africa's water resources
- To re-focus groundwater characterisation towards integrated water resource management in line with national needs and priorities
- To promote better utilisation of South Africa's limited water resources by supporting research and technology transfer actions aimed at improving water quality management

Research thrusts

- Water resource assessment
- Integrated water resource development
- Management of natural and human-induced impacts
- Policy development and institutional arrangements

Areas of key importance

- Global climate change and water resources in southern Africa
- Daily rainfall mapping over South Africa
- Fractured-aquifer characterisation
- Flood nowcasting
- Development of a strategic research investment framework for basement aquifers
- Flow conceptualisation and storage determination of Table Mountain Group aquifer systems
- Stakeholder participation in the establishment and governance of catchment management agencies (CMAs)
- Co-operative governance of CMAs

Contact details:
Water Research Commission
Private Bag X03
Gezina
0031
Tel: +27 12 330 0340
Fax: +27 12 331 2565
Website: www.wrc.org.za
Enquiries: Yuven Gounden
E-mail: Yuveng@wrc.org.za

Water Research Commission

ISSN 1683-9730
June 2003

amanzi

Newsletter of the Water Research Commission



In This Edition

Going With the Flow

It was Jacqueline (Jackie) Mary King's love of animals that was the catalyst behind her astronomical success in the water sector. This passion spurred her on to study Zoology. During the 70's Jackie had two options: studies in marine biology or freshwater ecology. Jackie's choice of the latter field of study was prompted by her need to establish strong family ties-research in marine biology would cause the family to adopt a nomadic lifestyle or to be fragmented: her prowess in this facet of her life is exemplified by her amazing feat of completing her PhD in 1982 whilst simultaneously rearing her two young children.

It is no wonder that Jackie won the recent Women in Water Award in the "Researcher over 35" category. This talented woman commenced her studies at UCT as a mature age student, a category for students who did not hold a matric certificate! After this, Jackie undertook research for the then Foundation for Research and Development (FRD), now the National Research Foundation (NRF) as a part-time researcher from 1983 until 1988. Once again, Jackie's maternal instincts drove her to conduct research on a part-time basis. It was not uncommon for her children to also be present at the research sites. It was only in 1989, when she was 40-something, that this eminent researcher first undertook research on a full-time basis.

Jackie has dedicated 28 years of her life to inland waters ecological research and management whilst she progressed from Scientific Officer to her current position of Principal Research Officer at the University of Cape Town and Consultant with Southern Waters Ecological Research and Consulting. Jackie recalls the daunting period when she was initiated into the arena of Environmental Flow Assessment (EFA). It took untold reserves of dedication and perseverance to progress from novice to international expert in a very alien world of managers, politicians and engineers- an accomplishment that only a person of the calibre of Jackie could achieve! This self-taught expert on rivers and their patterns of flow says, "I admire the WRC immensely for its early decision to invest funding in the new avenue of research that is now called environmental flows" – an avenue that provided Jackie with "the most important decade of my (her) career," and where her development of expertise could only be equated to "riding the crest of a giant wave of change in South Africa ". And a wave it was- Jackie's work progressed in gigantic steps once she had the opportunity to network with engineers from the Department of Water Affairs and Forestry (DWAF) and other researchers supported by the WRC .

Jackie's first innovation was the development, with scientific colleagues countrywide, of the Building Block Methodology, a pioneering initiative that served its purpose, but it had the drawback of being somewhat inflexible. This spurred Jackie and her colleague, Cate Brown of Southern Waters, to develop the Downstream Response to Imposed Flow Transformations (DRIFT) method. This method is a flexible tool that describes scenarios of how changes in the patterns of river flow will change the river ecosystem and affect the people who depend on the river for subsistence.

Jackie's expertise has not been confined to South Africa alone. She has collaborated in research on a global scale. She served as the project director on a multi-million rand project with 27 scientists from five countries to give advice on environmental flows for the Lesotho Highlands Water Project. The World Bank saw fit to recruit Jackie as an advisor on Environmental Flows for Tanzania as well as for South-East Asian countries.

Jackie laughs off the idea of retirement. In the next five years, she plans to dedicate some of her time to being World Bank Advisor on Environmental Flows for the four countries of the lower Mekong River (Cambodia, Laos, Thailand and Vietnam), a project that really excites her. This self-made authority is constantly faced with requests to assist other countries such as China, Russia, Canada and many European countries. "It is through the combined efforts of the WRC, DWAF and the national body of river scientists that South Africa is a forerunner in the field of EFA. This makes South Africa marketable in this field. All we need now is expertise to fast track this process."

Jackie's commitment to her research field has led to her being the recipient of various awards, the most recent being the Silver Medal of the Southern African Society of Aquatic Scientists as well as the Women in Water Awards (2003) in the category Researcher 35 Years and older. Regarding the latter award, Jackie says, "I feel proud and grateful to be nominated. I am grateful to all those who were involved in the process because they certainly made me feel appreciated."

Jackie has been consistently involved with WRC projects since the late 80's. Steve Mitchell, Director: Water-Linked Ecosystems at the WRC says, "Through consistent effort, good science and a willingness to tread untrodden paths, Jackie has made substantial progress in developing the discipline of environmental flow assessment. She took the work from concept to implementation, and a strength of hers is her ability to work with teams of dedicated people. This became evident in the implementation of the Building Block methodology and again in the initiation, editing and production of the manual for the method. This manual makes the Building Block Methodology one of very few methods of environmental flow assessment for which a formal manual exists."

Jackie's formula for success is, "You are never too old to get started. Be professional, believe in yourself and the worthiness of your work, and do not be intimidated." The mosaic of Jackie's experiences will soon appear as a bestseller: that's right - Jackie will write a book and she has a title in mind: "Tall Poppies". However, unlike the expression that has menacing undertones of decapitation by jealous individuals, Jackie wants to capture all the outstanding events, people and circumstances that she encountered whilst she worked in the water sector. Be on the lookout for this gem shortly!

Jackie says, "The WRC made a significant contribution to international science through their support of environmental flow research. I am deeply grateful for the opportunities they have given me and their belief in our work."

Jackie, your work and contribution to the water sector is recognised by the WRC. Your recent achievement at the Women in Water Awards is indicative of your significant contribution. We at the WRC are grateful for your contribution and your commitment to serving the South African and the International water sectors.

Water Research Commission

Balancing the Books

The first thing that struck me about Aveen Rampershad was his quiet, unassuming manner. However, after chatting to him for a few minutes, I was able to discern an analytical and strategic thinker. Let me introduce you to the WRC's Director: Administration & Finance.

Unlike the stereotype of the boring, grey, hawk-eyed, figure-obsessed Chartered Accountant, Aveen came across as a talented, versatile and balanced individual. He began his academic career at Wingen Heights Secondary School in Durban. This seems to have been his launching pad to the corporate world. His role as Head Prefect was balanced by his captaincy of the School Chess Team as well as winning the Annual Karate Championship (Senior Division) in 1986.

This young man completed his B Com degree (CA stream) at the University of Natal, Durban. He then went on to complete his Honours degree in 1994. There was no stopping Aveen whose flair for figures drove him on to pass his Public Accountants and Auditors Board Examinations. He completed his articles in 1997, which afforded him the status of a qualified Chartered Accountant.

Thereafter, he worked in various roles of Financial Management. His work experience reads like a bestseller: KPMG; Gilt Edged Management Services, Masstores, Robertsons Spices and Old Mutual to name but a few. In addition, Aveen has successfully set up an international trading company and two branches. "My various positions have given me both local and international experience in Accounting, Financial Management, Auditing, Consulting, Project Management, Research and Computer Software," says this enthusiastic Accountant. The adage of "all work and no play" does not apply to Aveen. He finds the time to keep fit, read and travel.

The WRC is set to prosper under the leadership of a young man who echoes our very own vision and mission statement: "I am particularly keen to work within a stimulating, professional and ethical environment that offers opportunity for personal and professional growth." Aveen, you have come to the right place and you are here to stay!

Have you settled into your new position?
Yes, I have been off to a quick start. Lots to do and little time to spare! Being the financial year-end it is one of the busiest times for us. I am enthusiastic and look forward to the days ahead. I am excited about the prospect of being part of the WRC mission: promoting a better quality of life for all.

What are the some of the challenges that you envisage?
My immediate challenge is to ensure that we are geared to meet all requirements and deadlines of the impending year-end audit. Closely related to that are the changes brought about by the Public Finance Management Act and ensuring compliance therewith. I think that a great challenge is to provide accurate and timeous information to enable Executive and the Board to arrive at decisions. In this regard, systems will have to be established to help identify and highlight potential problems. This will enable us to be proactive and address problems timeously as opposed to reacting to them. The idea is for us to be consistent, timeous and meticulous in our dealings. I am also eager to learn more about the research work facilitated by the WRC. I feel strongly about our contribution and the role we play in improving the quality of life of our people.

What innovations are you thinking of introducing to the WRC financial machinery?
I would like to ensure that we have sound internal controls, accounting systems and audit trails. This is the basic foundation required for a strong and successful Finance Department. I also see the need to support the process of funding and project management by integrating and aligning the work produced by our Finance Department with the needs of others. I also intend identifying areas where we can improve efficiencies and enhance the quality of our work. One such area is to generate a central pool of information which will form the basis of reports. This will ensure that the information used by all will be consistent and that the corresponding reports will be accurate. There is also a need for flowcharting work processes and exploring innovative ways of working without compromising the results. I intend developing a proactive, enquiring and thoughtful approach to our work.

Where do you see the WRC in the next 5 years?
Within the WRC I envisage an efficient and dynamic department that produces sophisticated decision-useful information. I see us working efficiently and being focused and closely aligned to our Vision and Mission Statement. I see us playing a greater role in strategic goal setting and decision-making. I see the WRC as a pioneer and leader in its field. We can assist in making a difference in the lives of millions of people. I am extremely positive and envisage a bright future ahead.

The WRC @ the EDC Workshop

Delegates at the EDC Workshop

The presence of endocrine disrupting compounds (EDCs) and toxicants in the environment and water has become an important national and global issue. The WRC is funding research within the Water and Health domain to:

- Ensure the quality and protection of drinking water
- Address the recognition and prevention of health-threatening water quality deterioration.
- Ensure the delivery of safe and acceptable water to users.

One initiative of this WRC domain was to organise a workshop on EDCs and toxicants at the Morgenhof Wine Estate, Stellenbosch from 5-7 May 2003. The workshop included talks by international and local experts on these topics. The objectives of the workshop were to:

- Learn about European modelling developments as well as American and Japanese EDC research programmes.
- Recap South Africa's status quo regarding EDC and toxicants research and development.
- Develop a five-year research programme and terms of reference of projects for EDCs and toxicants in South Africa.

The workshop was well represented and presented an opportunity for information gathering and strategic planning.

amanzi
Newsletter of the Water Research Commission
June 2003

The New, Improved WRC Website

The new, improved WRC website

On 29 April 2003 the WRC launched its new website. The website has been revamped with the following innovative features:

- Easy to use drop-down menus on the left-hand side.
- Fewer clicks to get to the destination.
- Quick links for fast access to popular sections of the site.
- Faster downloading time.
- Categorised search facility.
- Corporate and research information (KSAs, XDs, Call for Proposals)
- New publications (Amanzi, Water Wheel, Knowledge Review)

So, what are you waiting for? Get surfing and explore the WRC on the world-wide web!

What's New

Report No 662/1/03
Evaluation and optimisation of a crossflow microfilter for the production of potable water in rural and peri-urban areas
This project concerns the evaluation of woven fibre crossflow microfiltration (WFMF) as a package treatment process for the production of potable water in rural and peri-urban areas. WRC Report No 386, "The Development of a Crossflow Microfilter for Rural Water Supply" was established to assess the applicability of the WFMF process for the production of potable water in rural and peri-urban areas. This project is a follow-up to Project No 386, and concerns the further development of the woven fibre microfiltration system for potable water production in rural and peri-urban areas. Areas explored are: improving the cleaning system on the WFMF unit; establishing a reliable, easily operable and fully automated demonstration unit for the process and evaluating the performance of the WFMF unit operated in the dead-end mode.

Report No 780/1/02
The effect of the introduction of agroforestry species on the soil moisture regime of traditional cropping systems in rural areas
In response to a request from a local farmers' association in the Upper Thukela region of the KwaZulu-Natal Drakensberg, a project was initiated in 1997 to examine the potential of an agroforestry system to increase fodder production. The aim of this study was to determine the optimum combination of fodder trees and maize to increase production and minimise soil water competition. In spite of decreased maize yields in the trial, the study revealed that increased fodder and fuel wood production could result in considerable savings for the farmer: savings have been recorded of up to R4500 on dry maize supplements and R2700 on fuel wood per annum per household.

Report No 930/1/03
A preliminary investigation into the application of ultrasonic techniques to membrane filtration
Membrane fouling is a critical problem limiting the wider application of separation by membrane filtration. In this project an ultrasonic time-domain reflectometry technique was developed as a non-invasive technique to investigate fouling layer formation and growth on membrane surfaces in microfiltration, ultrafiltration and reverse osmosis. The ultrasonic testing technique provides a method for the early detection and monitoring of fouling in progress. This investigation has formed the basis for a second project (1166) on the visualisation of the effects of electro-magnetic turbulence defouling techniques in membrane units. This work will be "Membrane fouling and visualisation studies", which is a cooperative project under the PentaParty agreement.

Report No 852/1/03
Preparation and characterisation of electrodes for the electro-chemical conversion of organic pollutants in water
Electrochemical oxidation has been proposed as an alternative method for the removal of organic pollutants from water, especially for dilute solutions of biorefractory organics. The use of high oxygen-overvoltage anodes for the direct oxidation of refractory organic chemicals is of great potential value in wastewater treatment. Anodic oxidation does not release undesirable chemicals into the water as is the case with chlorination. This project addressed the design, preparation, characterisation and evaluation of new and improved electrodes for the electrochemical conversion of hazardous organic pollutants in water. The oxidation of phenol, a common contaminant in water, was chosen as the model pollutant with which to evaluate the new electrode material in this study.

Report No 1098/1/03
A unit stream power model for the prediction of local scour in rivers
Scour is the principal cause of the failure of many bridges and other hydraulic structures. Deposition is also responsible for such failure. Scour and deposition form part of the field of sediment transport, which is part of the field of fluid mechanics. The capability of computers coupled with sophisticated software has facilitated the use of a three-dimensional mathematical model for the estimation of scour and deposition. This report has four parts: Literature review and theoretical background, proposed unit stream model of scour and deposition, numerical analayses using this model and conclusions and recommendations for future work.

Report No TT 179/02
Hydrogeology of the main Karoo basin: Current knowledge and future research needs
This report is aimed at groundwater practitioners working in Karoo fractured-rock aquifers, especially those involved in rural water supply projects and WRC-funded research projects. The report collates the vast amount of existing knowledge on Karoo fractured-aquifers and identifies future research needs. The information is conveyed to practitioners in a systematic way and provides an inventory of all relevant published material on Karoo fractured-aquifers.

Report No 648/1/02
The application of computational fluid dynamics to water and wastewater treatment plants
Computational Fluid Dynamics (CFD) modelling case studies of four full-scale real-life units (two potable water clarifiers, one wastewater treatment clarifier and one BNR activated sludge reactor) demonstrate that, in each case, the application of CFD can lead to practical benefits. The benefits are situation-dependent. For example, where modifications could be made to the units based on model predictions (2 out of 4 studies), remarkably simple, cheap and (sometimes) counter-intuitive solutions were identified. In the other two cases, valuable information on hydrodynamic and kinetic process behaviour could be obtained. The results demonstrate that, in suitably selected situations, CFD modelling can provide a cost-effective tool for (a) describing or analysing systems where complex flow patterns significantly affect mass or energy transport phenomena and the resultant distribution of fluid flow components, (b) diagnosing poor performance, and, most importantly, (c) identifying potential improvements without the need to carry out expensive, time-consuming and disruptive empirical full-scale studies.

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