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Newsletter of the Water Research Commission
August 2003



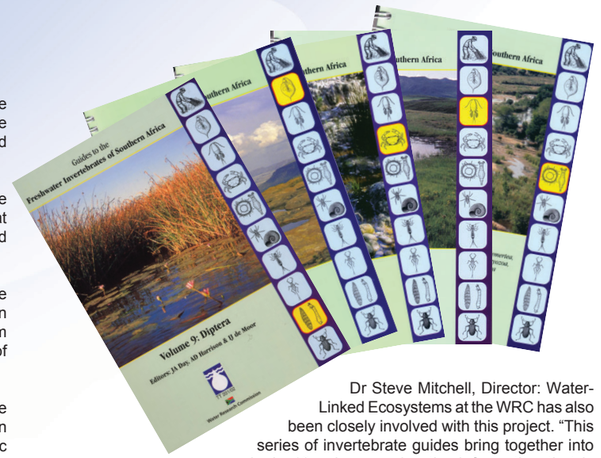
Guides Launched

On 1 July 2003 the WRC's guides of Freshwater Invertebrates were launched in Cape Town at the SASAqS/ZSSA Conference. These guides are ground-breaking in that they will benefit scientists and students in Southern Africa as well as internationally.

The aim of these guides is to synthesise much of the existing knowledge on the identification of freshwater invertebrates into a standard format that is accessible to users who wish to identify taxa beyond their field of expertise.

The books in the series are the culmination of years of effort by a large number of people and organizations (about 50 authors (Southern Africa as well as international). Umgeni Water, the Albany Museum and the WRC have given organizational support at various stages of the project.

Project leader, Dr Chris Dickens, who was funded by the WRC says,"These guides are ground-breaking for the management of rivers in Southern Africa. For the first time ecologists and biologists who are not taxonomic specialists will be able to identify many of the creatures living in our rivers. This will enable them to interpret what is going on in those rivers, whether the river is under stress and whether the river is going to continue to provide the goods and services which rivers naturally do so well. For the long-term sustainability of mankind on this planet, it is necessary that we are able to do this - after all as the maxim says, "you can't manage what you can't measure". These guides will provide a yardstick for measuring current river health and this will go a long way to allowing us to manage rivers for the good of all."



Dr Steve Mitchell, Director: Water-Linked Ecosystems at the WRC has also been closely involved with this project. "This series of invertebrate guides bring together into a single 10 volume series the information that is contained in the international literature, and so will give ecologists the opportunity to identify the animals with which they are working. Many of the keys have already been used in laboratories and have proved their worth as teaching aids. The WRC funded a course on the use of the three volumes on the Crustacea (vols. 2, 3 and 4) which assisted users in getting to grips with the intricacies of this group. This series will remain the definitive work on Southern African aquatic invertebrates for some time to come."

Key Strategic Area (KSA): Water-Centred Knowledge

The WRC is a knowledge organisation and hence its fundamental business processes are knowledge-based, thereby creating value for the WRC and its stakeholders. Our knowledge capabilities determine our effectiveness at creating value through those processes. Knowledge management and creation require both cultural and functional changes. The embodiment of the culture of knowledge forms the basis of the WRC mission while focusing on the WRC vision. Management and transfer of knowledge are the keys to providing a valuable service to the South African water users.

A creative approach to knowledge management will be achieved within the following management areas:

Dr Innocent Msibi: Director - Water-Centred Knowledge

Rina Human: Group Assistant

1 Strategic Research Advice (SRA)

Working with a variety of institutions, internally and externally, exchange of information and data on developments around water management issues.

Lindani Gumede: Information Technology Officer

2 Information and Communication Technology (ICT)

Development of enabling systems and tools, E-publishing and E-business, and supporting the community of practice.

Jenny Ash: Research Information Officer

Daphney Kgwebane: Document and Information Officer

3 Research Information and Document Management (RIDM)

Building databases, nation-wide knowledge engines/ networks and increasing public understanding of water-related issues.

Rina Winter : Knowledge Dissemination Officer

Judas Sindana: Printing and Distribution Support

4 Publishing and Publications Centre (PPC)

Dissemination of knowledge created via the support of the WRC as well as other sources of water-centred knowledge.

5 Water-Centred Media and Activities (WCM)

Dissemination of water-centred knowledge in the national and international arena through publication of an internationally rated journal and through increasing the public understanding of science.

Ingrid Buchan: Science Editor

Jan du Plessis: Public Understanding of Science Officer

Drinie van Rensburg: Design/Multimedia Publisher

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ISSN 1683-9730
August 2003

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In This Edition

Down to Earth!

"He is a relatively young, dynamic and enthusiastic researcher and teacher who has completed a number of projects and is still involved with research projects in KSA (Key Strategic Area) 4: Water Utilisation in Agriculture. I think he is ideally suited for mentoring students," says Dr Gerhard Backeberg, Director: KSA 4, of Professor John Annandale.

Prof Annandale is a full Professor at the University of Pretoria, Faculty of Biological and Agricultural Sciences. This Zimbabwean-born researcher has undertaken extensive water research for the Water Research Commission (WRC).

He boasts a B.Sc. (Agric) (Hons) (*cum laude*) in Agronomy (University of Pretoria); an M.Sc. in Water Relations (University of Pretoria) and a Ph.D. in Soil Physics (Washington State University).

A significant contribution is John's development of a user-friendly Soil Water Balance model (SWB) that is being used by farmers, researchers and consultants to schedule irrigation. "This is the result of several WRC projects. Together with colleagues of mine, we have used it as a teaching tool to help students to better understand complex relationships regarding soil physics, atmospheric evaporative demand and crop physiology," says this brilliant researcher.

Like most scientists, Prof Annandale has networked with other universities the world over and participated as a guest lecturer on many occasions. One such visit occurred in October 1998 where he spent six weeks at Washington State University and worked with Dr Gaylon Campbell on two-dimensional modelling of radiant interception at the soil surface. This work produced the prize-winning paper at the SASCP Congress in January 1999 and has been written up and accepted for publication in the prestigious journal *Agricultural and Forest Meteorology*.

John has broken the mould of the professor stereotype by participating proactively in many community outreach projects: The SWB irrigation scheduling model has gained popularity and there are several groups and individuals using it and seeking support. A need has arisen to start offering short courses to assist those using SWB. This has been formally structured now by a WRC technology transfer project. Thus far, three consultant level courses have been presented. In addition, two farmer level courses have been presented with several more being planned country-wide until the end of 2003.

John's team is also developing a self-paced, multi-media teaching package on Irrigation Management that will be used at the University of Fort Hare and, most likely, at several other tertiary education institutions country-wide. A further output of this project is that it has been patented and mass produced by Agriplas, a South African company.

Another project with a strong outreach focus is the WRC project on cheap and simple irrigation scheduling using wetting front detectors. There is a strong thrust in this project to get this technology accepted and used by both commercial and resource-poor farmers.

Prof Annandale is multi-talented: he is involved in a WRC-Coaltech 2020 project to develop a salt and water balance model and assisted in determining the environmental sustainability of irrigation with gypsum-rich waste water; he has been an invited speaker at many conferences; he has served on many WRC steering committees and journal editorial committees; he serves as an external examiner and has acted as a referee for many science publications.

Meiring du Plessis, Head of the cross-cutting domain, Water and the Economy and Research Manager in charge of Mine Water Management says, "John and his team have been involved in investigations to determine the environmental sustainability of irrigation with gypsum-rich waste water, of which large volumes are being produced through coal and gold mining activities. Their investigations have allayed most of the initial concerns related to the sustainability of the practice from an agricultural perspective. As part of a WRC-Coaltech 2020 project, they are presently tackling the question of sustainability from a water resource quality perspective. Such work is invaluable to the WRC and to the country as a whole."

John's talent is not restricted to the world of science: he is a keen marathon runner and four times Comrades Marathon participant. He also plays the bagpipes for the Pretoria Highlanders and he manages to pursue his love of agriculture by being a part-time farmer. He is also a father of two primary school children.

Does the good professor enjoy a 28-hour day? How does he do it? "I get an enormous amount of support from my wife and members of our water research group, and that is the only way that one can cram all these activities into such a busy schedule," he quips.

Prof Annandale, the WRC supports your work and is glad to invest in intellectual capital of such titanic proportions.

Thinking About a Career in Water?

The WRC is planning a booklet dealing with careers in the water sector. This interactive and well-illustrated guide will be useful for those learners who are interested in pursuing a career in the water sector.

Careers will be aligned with various parts of the water cycle and when taken collectively, will cover the whole cycle. The job descriptions will be organized in 4 sub-section clusters with about 12 jobs prioritised in each. The sub-section clusters are: Policy and Management; Physical Geography; Human Intervention; and Agricultural and Rural.

The booklet is expected to be launched in September 2003.

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Farewell Daphney

Daphney Kgwebane began her career as a Biology teacher before she joined UNISA as registrations officer. She has been at the WRC for the past 4 years. She commenced work at the WRC in April 1999 as a senior registry clerk. In November of the same year she was promoted to Chief Publication Officer. When the organization underwent a process of re-structuring, Daphney was appointed as an Information and Document Officer with the Water-Centred Knowledge KSA. She was tasked with the responsibilities of managing relocation of information and archived information, overseeing the library as well as the publication and reading rooms, developing policies and procedures for information sharing, handling and use and liaising with other libraries and publication houses.

This energetic woman has accepted a post at Medunsa as Deputy Director: Communication and Marketing. "I am looking forward to the challenges of this position, but I shall always be nostalgic about the WRC. My fundamental development as a communication professional began at this organization and it will always be close to my heart."

Dr Innocent Msibi, Director: Water-Centred Knowledge says: "A change of employment is generally an opportunity for advancement for an individual. I wish Daphney a successful and rewarding stay at Medunsa, and hope that any experience gained at the WRC will make her a valuable employee. She will be missed at the WRC."

Daphney, the WRC wishes you everything of the best in your new position.

WRC stalwart retires

Ms Martha Pretorius retired from the WRC at the end of July 2003. Martha was employed at the WRC from 1997. During her seven-year stint she has proved herself as an adept Information Specialist in the water sector.

A chemist by training, she started her career analysing food samples at the SABS. Thereafter, she moved to the CSIR where she worked as a research assistant in the Optics Department at the National Physics Research Laboratory. The major part of Martha's career was spent at the CSIR Informationtek (1976-1996), the last few years as manager of the SA Water Information Centre (SAWIC), a project that was funded by the WRC. Martha's association with the WRC certainly stretches far back and her contribution has been significant. When the WRC underwent a process of re-structuring, Martha was appointed PR/Communications Officer. She has been instrumental in contributing significantly to the WRC communication strategy and business plan as well as the production of promotional corporate gifts, brochures, pamphlets and billboard-type of posters. Her presence was felt at various exhibitions where Martha acted as a proud ambassador for the WRC.

The highlight of her career was when she was elected for a two-year term as secretary of the International Association of Aquatic and Marine Science Libraries and Information Centres (IAMSLIC). She also presented papers at IAMSLIC conferences in Iceland and France.

Dr George Green, Deputy CEO of the WRC and the Manager of the PR/Communications Division says, "When a person of Martha's calibre and skills leaves an organisation, there will inevitably be a noticeable gap – in this instance we are losing someone who combined a sound scientific background, many years of experience in water-centred information and communication, and a passion for marketing".

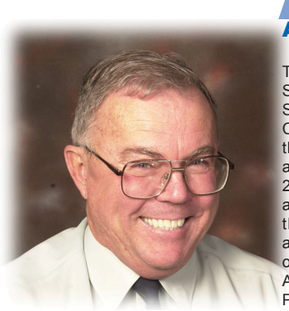
Martha was involved in the development of the Waterlit database for many years and was the author of an indexing guide: *Indexing for the Waterlit Data Base: A Practical Manual* (1983) and compiler of the *Selected Bibliography on Wastes* (1986-1989) for the CSIR Information Services.

Martha's drive will prevent her from leading a sedentary retirement and she plans to occupy herself by travelling as far and as wide as possible, sharpening her bird-watching and wine-appreciation skills and trying to understand the music of Wagner. She has also received an invitation from the Association of South African Indexers and Bibliographers (ASAIB) to act as author on the indexing of material on environmental issues which will form part of a book published to provide know-how and guidelines for indexers in the country.

"Obviously, all these activities will require tracing and studying the relevant information resources – a task that I usually enjoy tremendously" says Ms Pretorius, speaking like a true Information Specialist.

Martha, the WRC thanks you for your contributions over the years and wishes you well with your well-deserved retirement.

A Silver for Steve



The culmination of the SASAqS/ZSSA (Zoological Society of Southern Africa) Conference in Cape Town was the awarding of the SASAqS awards at a banquet on 3 July 2003. Bryan Davies was awarded the gold medal whilst the two silver medals were awarded to William Rowlston of the Department of Water Affairs and Forestry (DWAF), Pretoria and Steve Mitchell, Director of the KSA Water-Linked Ecosystems at the WRC respectively.

Steve joined the WRC in 1990 after a two-decade career as a freshwater biologist. He has been instrumental in promoting research in aquatic ecosystems. Steve was a driving force behind the Kruger Park Rivers Research Programme. Furthermore, he took the initiative to involve the WRC in a thriving estuarine research programme.

As part of the South African Water Law revision, Steve collaborated actively with the Water Law Review Panel and Steering Committee and was also responsible for the sourcing of resources for research results to be made available to the Water Law Policy and Drafting teams. This resulted in a rapid and effective transfer of scientific knowledge into policy and law. The resultant National Water Act is firmly based on the principles of equity and sustainability, with recognition of the dependence of long-term water use, on resource protection.

Steve's medal was for his commitment and dedication to the promotion of aquatic research in South Africa and the integration of research and management.

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What's New

Report No 1271/1/03 (Contractor: Ninham Shand)
Investigation of water supply issues in typical rural communities: Case studies from Limpopo Province

This study was commissioned in order to investigate inherited problems such as poor operation and maintenance of water supply schemes. It focused on why some of the schemes are non-functional or functioning intermittently. Guidelines were formulated to ensure appropriate operation and maintenance of the schemes. Schemes which are functioning well, with similar social dynamics, and socio-economic levels were also investigated to get a balanced understanding so that appropriate guidelines could be formulated.

Report No 1082/1/03 (Contractor: University of the Free State)
Further development of a biotechnological approach to the management of waste waters from the pulp-and-paper industry

Remediation of industrial wastewaters from the pulp-and-paper industry was investigated using biotechnological methods such as pretreatment with enzymes, white-rot and mucoralean fungi. The waste waters treated were from the extraction stage of the bleach plant and the spent sulphite liquor from the pulping stage of pulp production. The effectiveness of various techniques for waste water bioremediation was evaluated based on the extent of waste water decolourisation and the impact on chemical load, chloride content and chlorinated organic matter.

Report No 846/1/03 (Contractor: University of Western Cape)
Development of a continuous flow membrane bioreactor catalysing the solubilisation of hydrophobic pollutants by rhamnolipid-producing bacteria

Chemical waste, especially in industrialised regions, is inevitable. The more biodegradable compounds are degraded in general waste water treatment processes. The recalcitrant compounds and xenobiotics require specialised treatment. The cause of the low efficiency of biodegradation of such compounds is their low solubility in water. The project resulted in the development of a technology for the biodegradation of hydrophobic pollutants, such as oil, by emulsification using a membrane-supported biofilm producing the surfactant rhamnolopid produced by *Pseudomonas aeruginosa.*

Report No 1035/1/01 (Contractor: University of Stellenbosch)
Cleaning and pre-treatment techniques for ultrafiltration membranes fouled by pulp-and-paper effluent

In a previous WRC project (WRC No 660), methods for effluent and foulant characterisation, membrane cleaning and membrane pre-treatment techniques were developed and successfully applied to membranes fouled by pulp-and-paper effluent under laboratory-scale conditions. The reason for the investigation into this specific effluent was the deterioration in the performance of the membrane plant at the Mondi Kraft mill due to extensive fouling. During these studies, spectrophotometric analyses showed that pulp- and-paper effluent contained unsaturated aromatic compounds and that ultraviolet-visible spectroscopy could be used to estimate the concentration of these potential foulants in the effluent.

Report No 955/1/03 (Contractor: Rhodes University)
Use of indigenous riverine invertebrates in applied toxicology and water resource-quality management

This project was conducted in close collaboration with the Institute for Water Quality Studies (Department of Water Affairs & Forestry (DWAF)). It furthered the application of ecotoxicological research methods using indigenous riverine organisms as test taxa; continued to develop methods of applying the results to the development and refinement of guidelines; and further contributed to the development of water resource-quality policy, including the application of toxicological end-points in permit criteria.

Report No 1063/1/03 (Contractor: University of Witwatersrand)
Modelling of terrestrialisation and technology transfer to enable management of Kruger National Park rivers

This project aimed to engage research, prediction, technology transfer and monitoring through rule-based modelling (RBM), to enable effective adaptive management of riparian system response to changes in flow regime. The *Breonadia* model was implemented in order to reduce the loss of bedrock influence on the Sabie River. A structured monitoring programme was recommended to provide data for using this model. A further output of this project was the design and implementation of a monitoring programme for testing the RBM.

Report No 1045/1/02 (Contractor: University of Port Elizabeth)
Evaluating the environmental use of water - Selected case studies in the Eastern and Southern Cape

This project undertook a cost-benefit analysis of catchment management as carried out by the Working for Water (WfW) programme. It entailed the identification and estimation of the social costs and social benefits of the water resource conservation projects. The primary benefit of the programme is the increased water yield due to the clearing of alien vegetation. Other benefits include: training of workers and social upliftment, conservation of biodiversity, improvements in water quality, downstream industry development, flood control and the prevention of soil erosion, fire hazard reduction, increased livestock holding capacity and improved river system services.

Report No 1162/1/02 (Contractor: University of Cape Town)
Ecological and economic evaluation of wetlands in the upper Olifants River Catchment, South Africa

This report provides a preliminary assessment of the ecological and economic values of wetlands in the Upper Olifants River Catchment (UORC). The report provides the basis for developing a strategic framework for the conservation and management of these wetlands. The wetlands were classified on the basis of hydro-geomorphic determinants. A detailed digital map, showing the distribution of various wetland types in the UORC, accompanies the report. The project also served to create awareness of the wetlands of the UORC among local communities and to build capacity around wetland management and conservation.

Report No 831/1/03 (Contractor: Rand Water)
Development and implementation of gas and liquid chromatographic organic water profiles as a management tool

The project involved the setting up of gas and liquid chromatographic methods to determine profiles of organic compounds in water and to establish fingerprints of volatile and non-volatile fractions of both source and drinking water. There was also a need to compile a database of the profiles from different regions as well as to implement these profiles as a management tool. Sample profile differences were monitored on the basis of mass spectra and sensory characteristics. A record of the organic profiles of both source and processed water was kept. The removal efficiency of a treatment process for a particular profile in a specific region was examined.

Other new WRC reports:

1009/1/03: **Evaluation of groundwater flow patterns in fractured rock aquifers using CFCs and isotopes (CSIR).**
919/1/03: **Optimisation of an autonomous valveless gravity filter for the cost effective production of potable water for rural areas (Umgeni Water).**
1090-2/1/03: **Towards the resource directed measures: Groundwater component (University of the Free State).**
696/2/03: **Development of a non-point source assessment guide (DWAF).**
1128/1/03: **Survey of pesticide wastes in South Africa and review of treatment options (University of Natal, Durban).**
1031/1/03: **The occurrence of emerging viral, bacterial and parasitic pathogens in source and treated water in South Africa (University of Pretoria).**
991/1/03: **Capacity building needs of rural municipalities in the management of water and sanitation services: Case studies from the Eastern Cape (University of Fort Hare).**
692/1/02: **The treatment of wastewaters with high nutrients (N and P) but low organic (COD) contents (University of Cape Town).**
756/2/03: **The role of estuaries in South African fisheries: Economic importance and management implications (Institute of Natural Resources).**
1194/1/02: **Determining the water use and growth of forest plantations through GIS-based integration of remote sensing and field data in the 3-PG model (CSIR).**
1198/1/03: **Strategic review of river research (Inst Natural Resources).**
975/1/02: **Examining catchments as functional units for the conservation of riverine biota and maintenance of biodiversity (University of Cape Town).**
769/1/03: **Fabrication and production protocol for capillary ultrafiltration membranes and modules (University of Stellenbosch)**
999/1/03: **Evaluation of predictive models for pesticide behaviour in South African soils (ARC).**

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