## IWR TEAM TAKES ON THE APPLE EXPRESS

The Institute for Water Research entered a team for this year's "Great Train Race" – an annual relay event where teams of 10 runners carry batons over a distance of 72 km from Port Elizabeth to the picturesque village of Loerie. The teams compete against each other and the narrow-gauge steam-driven Apple Express Train.

Teams from all over the country, and all levels of athleticism, came to run against the train. Each stage is between 5.7 to 8.5 km, with some undulating country and seriously steep hills to challenge the legs. The IWR team was entered in the social category, and included a number of brave souls who had never run further than 100m before. However, they all managed to complete their stages and hand on the baton, so that the final runner, Sekhonyana Lerotholi, reached the finish line at Loerie Station a full hour before the cut-off time (but some hours after the train, which was only beaten by the winning team).

IWR Research Officers Nikite Muller and Lil Haigh drove the seconding vehicle and provided sandwiches and drinks to revive the runners.

*The runners, proudly wearing their finishers medals, beside the Apple Express.*
***Left to right (back row)**: Jay O'Keeffe, Andrew Slaughter, Sekhonyana Lerotholi, Tarqyn Human, Carol Moffett.*
***(Front row)**: Lucy Scott, Andy Gordon (Team Recruitment Officer), Valisa Ntomboxolo, Samantha Browne (Team Manager), and Nosiphiwo Ketse.*

## REPORTING BACK ON THE UNILEVER APPLIED AQUATIC ECOTOXICOLOGY COURSE

The Unilever Introduction to Applied Aquatic Ecotoxicology Course was held recently in Gauteng from 15-19 September 2003. Organised by Dr. Nikite Muller from the Unilever Centre for Environmental Water Quality (UCEWQ), in the Institute for Water Research at Rhodes University, it consisted of a 3 day theory course held at the CSIR Convention Centre, Pretoria and a 2 day practical course hosted by ECOSUN Environmental Consultants in Johannesburg. Delegates from the all over the country attended, representing government organisations (Department of Water Affairs and Forestry (DWAF) and eThekweni Municipality); educational institutions (Rand Afrikaans University, University of Cape Town and Technikon Northern Gauteng); and industry (SASOL, FOSKOR, and BHP Billiton).

Professor Tally Palmer and Dr. Nikite Muller of UCEWQ presented the bulk of the course material, providing insights on the application of toxicology in water law and policy, and covering a range of topics including aquatic toxicology theory, methods of conducting various toxicity tests, and analysis and interpretation of toxicity data. Guest lecturers Dr Sebastian Jooste of Resource Quality Services, DWAF; Dr. Hein du Preez of Scientific Services, Rand Water; and Dr. Lesley Phillips of SASOL provided specialist input regarding the role of toxicology within their respective organisations. A fourth guest lecturer, Ms. Elzabe Truter of the CSIR, concluded with a talk on Quality Assurance: Good Laboratory Practice and Accreditation. A combination of intensive lectures, specialist input and enthusiastic debate resulted in a rewarding, learning experience of the important role aquatic ecotoxicology has to play in resource management and industry, both now and in the future.

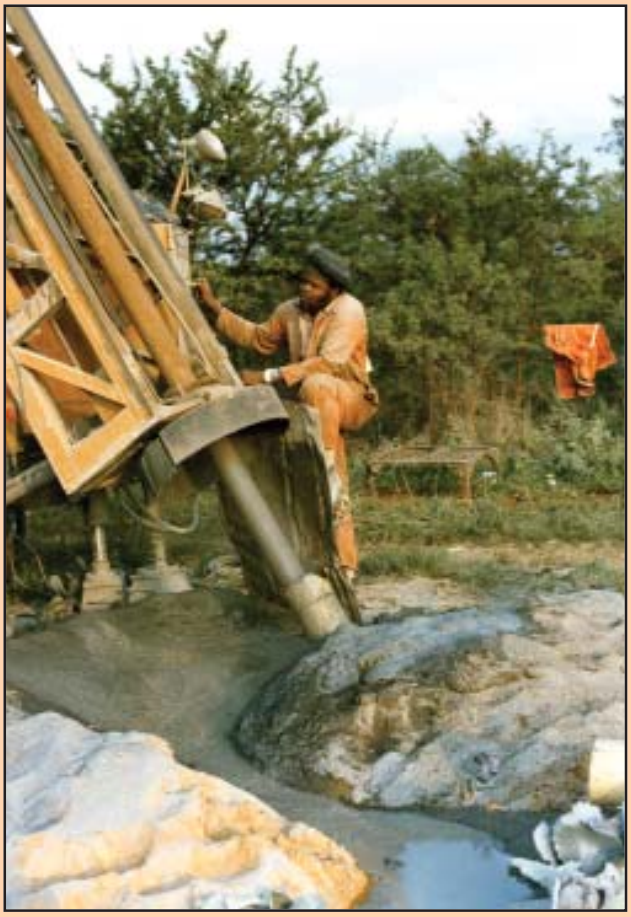
*The Unilever Introduction to Applied Ecotoxicology Course delegates:*
***Back row**: Mathew Ross, Sean Marr, Chris Williams, Randal Albertus, Ritva Mühlbauer, Boitumelo Mankazana, Prithie Naidoo, and Pieter Retief.*
***Seated**: Maryke Kruger, Nikite Muller (UCEWQ), Elmie Joubert, Aletia Chapman, and Riki Deale*
***Front row:** Fortunate Makhubu, Tally Palmer (UCEWQ), Zinhle Ngwenya, Suzan Oelofse, and Andrew Gordon (UCEWQ).*

## UPDATED GROUNDWATER STANDARDS (SANS 10299) AVAILABLE

The complete series of the updated SANS 10299 series (*Development, maintenance and management of groundwater resources*), is now available.

'The publication of this series, updated to include a glossary of terms (Part 0) and four other new parts (Parts 2, 7, 8 and 9), and cross-referenced to the new SANS numbering system, is a major contribution to the sustainable use of groundwater in South Africa' said Dr C Johnston, Divisional Director of Standards South Africa, the standards-generating arm of the SABS.

'The SANS 10299 series of standards is a national guideline developed specially for South African needs, as an appropriate suite of international standards was not available for adoption' he concluded.



### GROUNDWATER

Groundwater represents 97% of all the available freshwater supplies on Earth. According to a study commissioned by the Department of Water Affairs and Forestry, the total estimated yearly groundwater use of approximately 3 600 million cubic metres in South Africa accounts for 58% of the total quantity of groundwater (6 200 million cubic metres) available for exploitation and development in this country. This percentage takes into account the requirements of the ecological Reserve and basic human needs Reserve, as defined in the National Water Act (Act No. 36, 1998).

Under these circumstances, ensuring the sustainable use of groundwater is therefore an important priority for South Africa, and something the SABS 10299 series of standards developed under the mutual title of *Development, maintenance and management of groundwater resources* makes a significant contribution towards.

'The SABS 10299 set of standards brings together an updated synthesis of all the key elements associated with the use of groundwater in South Africa. It provides both the prospective and the existing groundwater user with a guide and easy reference to the best practices in this field', said Phil Hobbs, a well-known groundwater specialist and member of the technical committee.

'Whilst the set of standards provide the prospective borehole owner with a reference framework within which the necessary services can be secured and evaluated with confidence, more importantly, it also promotes the responsible development and sustainable use of this resource' he said.

"Deciding on the position of a borehole (as set out in Part 1) is, however, only the first step to owning a successful borehole. The other parts of the standard each address a specific milestone along this path, and are therefore equally significant in their contribution toward the sustainable use of groundwater" he concluded.

### STANDARD

There are nine parts of the standard. The titles of the individual parts are:

**Part 0**: *Glossary of terms*
**Part 1**: *The location and siting of water boreholes*
**Part 2**: *The design, construction and drilling of boreholes*
(There is no Part 3)
**Part 4**: *Test-pumping of water boreholes*
**Part 5**: *The design, selection and performance of pumping equipment for water boreholes*
**Part 6**: *The installation and commissioning of pumping equipment for production boreholes*
**Part 7**: *The rehabilitation of water boreholes*
**Part 8**: *The management of water boreholes*, and
**Part 9**: *The decommissioning of water boreholes*.

To purchase any or all parts of the standard, please contact Terence Moodley by telephone ((012) 428-6834), fax ((012) 428-6928) or e-mail (sales@sabs.co.za) .

## ICID WATSAVE AWARDS

The International Commission on Irrigation and Drainage (ICID) WatSave awards are presented to an individual or a team of individuals for an "outstanding contribution to water conservation/ water saving for increasing the beneficial and /or efficient use of water to develop and improve the sustainable use of this critical resource".

The award aims at:

- Promoting and encouraging the best technological applications or projects which have been successful in saving or recovering waste waters or poor quality water.
- Promoting other non-technological interventions or innovative land and water management techniques for increasing the availability of water for different uses.
- Promoting research that leads to substantial savings in water applications or uses.
- Promoting the development of new policies and approaches for water saving leading to the cost-effective and beneficial use of water.

The Awards are presented in three categories, namely: the WatSave Technology Award, the WatSave Innovative Water Management Award and the WatSave Young Professional Award.

All nominations received, are reviewed by a panel of judges, selected from the four regions of ICID: the Americas, Africa, Asia-Oceania and Europe.

The award consists of a honorarium (US$ 2 000 for the year 2003) and a citation presented at an IEC meeting.

# SCIENTIST WINS INTERNATIONAL AWARD FOR DEVELOPING A CHEAP AND SIMPLE IRRIGATION SCHEDULING TOOL

The International Commission on Irrigation and Drainage (ICID) has recently awarded its Watsave Technology Award to Dr Richard Stirzaker, a research scientist from the CSIRO in Australia, for developing the Wetting Front Detector – an inexpensive and "farmer friendly" irrigation scheduling tool. Dr Stirzaker was nominated for the award by SANCID (the South African National Committee on Irrigation and Drainage).

The Chairman of SANCID, Dr Gerhard Backeberg from the Water Research Commission, says this award recognises "the achievements and the successful co-operation between various individuals and organisations. Dr Stirzaker from the CSIRO in Australia conceptualised and developed the technology. Together with Prof Annandale of the University of Pretoria they submitted a research proposal to test the Wetting Front Detector amongst subsistence and commercial farmers in South Africa. The Water Research Commission supported and funded the research project over three years and it was managed by Dr Sizwe Mkhize from the Water Research Commission."

Backeberg says this research has led to the commercialisation of the Wetting Front Detector and the product will be manufactured under licence by Agriplas (Pty) Ltd in South Africa.

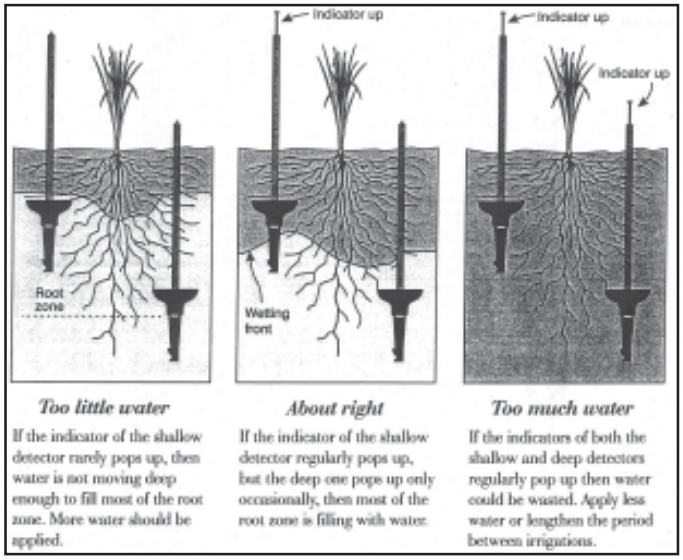
In an article on the Wetting Front Detector – From theory to Practice – researchers from CSIRO and the University of Pretoria say that there is an enormous gap between the science of irrigation and its practice on the ground.

"Although many good tools and methods to improve irrigation efficiency have been developed, most farmers do not use them. Therefore, the primary goal of the Wetting Front Detector is to reach farmers who are not making use of commercially available equipment due to its complexity or cost."

In South Africa, one of the priorities is that key constraints facing small-scale subsistence farmers must be identified and adaptive research done to overcome these problems. It is important for the farmers to decide when and how much to irrigate or to decide to stop irrigating to meet the water requirements of food crops under water scarce conditions. In this regard the Wetting Front Detector has shown exceptional merit.

### THE DETECTOR

Basically, the Wetting Front Detector is simply a funnel, a filter and a float, buried in the root zone. The Detector gives a signal to the irrigator when water, percolating through the soil, has reached it.




*Too little water*
If the indicator of the shallow detector rarely pops up, then water is not moving deep enough to fill most of the root zone. More water should be applied.

*About right*
If the indicator of the shallow detector regularly pops up, but the deep one pops up only occasionally, then most of the root zone is filling with water.

*Too much water*
If the indicators of both the shallow and deep detectors regularly pop up then water could be wasted. Apply less water or lengthen the period between irrigations.

The researchers say the detector works on the principle of flow line convergence. Water moving downwards through the soil is concentrated after the water molecules enter the wide end of the funnel. The soil in the funnel becomes wetter as the funnel narrows and the funnel shape has been designed so that the soil at its base reaches saturation. Once saturation has occurred free water flows through a filter into a small reservoir and activates a float.

The Wetting Front Detector can be used to schedule irrigation because the time it takes for the water to reach a certain depth depends on the initial water content of the particular soil. If the soil is dry before irrigation the wetting front moves slowly because the water must fill the soil pores on its way down. Therefore a lot of water is needed before the detector will respond. If the soil is quite wet before irrigation, then the wetting front will move quickly through the soil. This is because the soil pores are already mostly filled with water so there is little space for additional water to be stored. Thus a short irrigation will cause the detector to respond.

The float in the detector is activated when free water is produced at the base of the funnel. Water is withdrawn from the funnel by capillary action after the wetting front dissipates. A water sample can be extracted from the detector for monitoring the concentration of salt and nutrients.

The detector has been tested in the irrigated gardens of subsistence farmers, amongst small-scale farmers (less than 3 ha) and amongst large-scale irrigators.

## EXCHANGE VISIT SEMINAR FOR DIRECTORS HELD IN BOTSWANA RECENTLY

Botswana was honoured to be invited by IUCN to host the joint IUCN/SADC Water Demand Management Seminar for 2003.

The three-day event took place in the town of Selebi-Phikwe, approximately 400 km north-east of the capital, Gaborone, from 9 - 11 June 2003. Seventy delegates from six SADC countries attended the event, all of whom occupy senior positions with their respective organisations.

Day one was devoted to Welcome; Opening Address, Overview and Seminar Outline; and the Keynote address, which was presented by Seminar Facilitator, Simon Foster. This was followed after tea by eight prepared presentations. Botswana enjoyed the lion's share of four authors, two authors were from RSA and one each from Zambia and Zimbabwe.

Day two of the seminar took delegates on a visit to Botswana's largest dam, the Letsibogo Dam, just 10 km from Selebi-Phikwe. The dam supplies water to the 1.6 billion Pula North-South Carrier Pipeline project that was commissioned in April 2002. The pipeline stretches 360 km and delivers up to 90 million litres of water a day to the Mmamashia water treatment plant just to the north of Gaborone. The scheme is owned and operated by the Water Utilities Corporation who is responsible for the supply of water to the seven main towns and cities of Botswana.

After tea the group visited the nearby tribal community, which had been heavily impacted by the construction of the Letsibogo Dam. Impacts were both positive and negative and the delegates were keen to try and establish some kind of ratio between the two extremes. The community issues were recognised by the delegates as of great importance and much interest was shown. A meeting with the community had been arranged in the local 'Kgotla', the traditional meeting place in rural districts. The primary negative impacts had been the restriction of access to traditional watering points for the local livestock farmers, and problems being experienced with cattle getting stuck in the mud around the shores of the dam during periods of low water levels, such as have been experienced in 2003. Over 600 dead cattle have been removed in the first few months of the year.

Botswana, being a very flat country, does not have any suitable dam sites available for development. Letsibogo dam is very shallow with an extremely poor surface area to volume ratio and is also located in a very warm region resulting in extremely high evaporation losses. Reports suggest that for every cubic metre of water delivered, two cubic metres escape to the atmosphere. This has created a major dilemma for the Water Utilities officials who have to do a strategic balancing act between keeping the water in the dam and losing it to evaporation or using the water from the dam in preference to any other source to minimise the effects of evaporation (use it before it can evaporate) with the risk of emptying the dam at the height of the drought - the worst possible timing. This latter scenario will also expose the full extent of the mud-flats most frequently, resulting in high cattle losses for local community stock farmers.

After lunch the delegates visited the BCL copper and nickel mine and expressed concern at the apparent environmental havoc that met the group. The mine uses sodium chloride (salt) in its underground cooling plant which causes the salinity of the final mine effluent to rise to levels in excess of the limits for discharge to a natural stream. The mine has plans to dispose of the saline water onto a citrus orchard, which is currently being established.

To conclude the seminar, a number of "Theme Leaders" were identified and groups formed report back committees on the various issues of the site visits. Feedback by the Theme Leaders took place on the morning of the third day, which culminated with a session on the way forward and some of the broader issues relating to water demand management policies.

Consensus was that the seminar provided insight and opportunity for delegates and many friendships were formed between both individuals and nations from Mauritius to Angola.