Environmental Water Quality in Water Resources Management

Everyone and everything depends on water for life, well being and economic prosperity. Water is so important and is used in so many ways that if it is over-exploited, we risk damaging our very life-source. Over-exploitation of water results mainly from using too much water from our water resources, and then returning too much effluent and water containing waste.

The National Water Act recognises that water resources are part of the integrated water cycle. Closely connected to this water cycle is the use that people make of these various sources of water. The Act promotes protection of all of these water resources specifically so that there will be enough good quality water for present and future generations to use.

The implementation of the Act is captured in a three-tiered "Environmental Water Quality management" approach. Both ecosystems and water users have specific and individual water requirements. Managing water quality and quantity for ecological and human uses requires more detailed attention both to ecosystem health and the requirements of human water users. In this regard, ecological toxicity assessments as well as biological monitoring are playing an increasingly important role in water resource management.

There are methods to set objectives that will result in different levels of ecosystem and human health protection. These objectives are termed "ecospecs and userspecs". These eco- and userspecs objectives are then integrated into Resource Quality Objectives.

It is a mistake to think that aquatic ecosystems are always more sensitive to changes in water quality than the water used by domestic, agricultural and industrial users. Therefore, a detailed and proper understanding of the three-tiered approach to environmental water quality is crucial. This leads to a better understanding on how to manage our water resources in order to increase the environmental and social benefits derived from them.

This three-tiered Environmental Water Quality management approach has been recognised as a tool that can be of great benefit to people in all fields of water management – government, municipalities, industries, commerce, NGO's, consultants and the private sector. In other words, it is accessible to any person that has an interest in the management and conservation of our water resources. In this regard, Labhouse (Pty) Ltd (Bryanston) and EcoMonitor cc (Kempton Park) has formed a joint venture to develop, prepare, print and present course material to interested participants.

COURSE

The first course, held during June, was attended by 21 participants, which ensured lively participation. After the certificate ceremony, participants confessed a much better understanding of how water quality and toxicity interacts with biological processes and how all of this fits into both the environmental management and legal frameworks.

The next and last course for this year will be held from 17-19 November 2004. Course participants are encouraged to bring a water sample from their workplace or own environment for chemical and toxicological analyses. These results will be workshopped against the background of the course contents, thus allowing the participants to better understand and make more informed decisions about their environmental water quality.

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The EWQ Class of June 2004

Brought Back from the Brink of Extinction

The Working for Water Programme has benefited biodiversity enormously. Its positive effects have gone beyond job creation and rehabilitating hydrology, and have rescued species that were on the brink of extinction.

It was not realized just how damaging invasive alien riparian trees were until they were removed. The problem rests with the fact that invasive alien plants have a pernicious effect that over the years has crept up to blot out indigenous biodiversity.

Some dragonfly species were thought to be extinct as they had not been seen for years, with one being rediscovered having last been recorded in 1920. The point is that by removing invasive alien plants in wetland systems, there can be an enormous and immediate benefit. In particular, it is the very rare and localized endemics that have benefited most, with almost instant recovery of the endemic species where the invasive alien trees have been removed. The removal allows adequate sunlight to penetrate the system once more, and for streamside bushes to recover.

One of the most striking findings is that river braids are under such threat. Alarm bells have been ringing in Europe that pressure on river braids is having a major effect on local biodiversity. This seems now to be also the case for South African river systems. It seems that river braids are highly susceptible to invasion, simply because they are wet, warm and aerated. Yet they are also of great conservation value. The message from this is that pools in river braids ("kuile"), particularly in the Western Cape, need special attention.

Report and photographs by Michael Samways: Centre for Agricultural Biodiversity, Dept of Entomology, Faculty of Agricultural and Forestry Sciences, University of Stellenbosch.
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Basking malachite damselfly Chlorolestes apricans *was on the verge of extinction, but raising its profile is now leading to conservation action.*

The Ceres Stream damsel Metacnemis angusta, *formerly only known from two females, and not seen since 1920, was feared extinct. It has made a dramatic comeback as a result of removal of invasive alien trees under the Working for Water Programme.*

Harlequin sprite damselfly Pseudagrion newtoni; *disappeared from its type locality but has appeared at one site where cattle grazing of river banks and alien trees have been curbed.*

East Cape Research Institute Goes Global

The Institute for Water Research (IWR) at Rhodes University in Grahamstown has been well-known for many years as a leading innovator in the fields of freshwater ecology, hydrology and water quality, as well as community outreach. The Institute has been prominent in teaching, research and consultancy, as well as in the development of new environmental policies for water management in South Africa. In recent years, members of the Institute have been in regular demand in other countries, to present research findings, run courses and help with problem solving. In the past 18 months Institute researchers have made 18 visits to countries as diverse as Norway, Japan, South Korea, Switzerland, the USA and Australia, all at the invitation of the host countries.

Now members of the Institute are taking up senior positions in other countries, not in order to leave South Africa, but to use their experience and skills on the global stage, while increasing the opportunities and resources for training and research here.

O'KEEFFE

The current Director of the IWR, Professor Jay O'Keeffe, will be going to Holland at the end of September, to take up a position as UNESCO WWF Professor of Freshwater Ecosystems at the UNESCO Institute for Water Education (IHE) in Delft (UNESCO is the United Nations Education and Science Organisation, and the WWF is the World Wildlife Fund). The IHE specialises in research and training in freshwater for developing countries. Professor O'Keeffe's responsibilities will be to build up the IHE's capabilities in freshwater ecology, and to initiate and support training and research projects in developing countries. "I have indicated to the IHE that I would like to continue to make Southern Africa the focus of my activities, since this is where my experience is", says Prof O'Keeffe. "The philosophy at the IHE is to initiate projects, train local personnel, and hand over responsibility to the host country. South Africa provides an ideal platform for these types of project, because there are already institutions such as the IWR, with the expertise and capacity to take on training and research projects. I shall be aiming to build on that capacity, and to access resources that will make the IWR and other research centres more effective."

PALMER

Professor Tally Palmer has spent the past few years developing a very successful water quality research centre within the IWR. She is presently the Director of the Unilever Centre for Environmental Water Quality, which is sponsored by the Unilever Foundation, and specialises in assessments of the environmental effects of changing water quality in South African freshwater ecosystems. She has recently accepted the post of Director of the Institute for Water and Environmental Resource Management at the University of Technology, Sydney, in Australia. IWERM has research groups in ecotoxicology, waste water engineering, geohydrology and plant-water relations. Tally hopes to forge strong links between IWERM and the IWR. "Over the past five years we have built the Unilever Centre into one of the largest water quality training and research facilities in the country. I am confident that the Centre is now a fully self-sustaining organisation, and I hope to provide it with fresh opportunities at a global scale. The work we have

Back: Mrs Lil Haigh, Prof Denis Hughes & Dr Nikite Muller
Front: Profs. Tally Palmer and Jay O'Keeffe

done on salinity impacts in South Africa are relevant in Australia, and well as in developing countries in the rest of Africa and south-east Asia."

Prof O'Keeffe will take up his new Chair in Holland at the beginning of their academic year in October, but will be returning to visit South Africa in December and April next year. Prof Palmer will take on the UTS Chair at the beginning of 2005. The Institute will be looking for new researchers to join the team of Prof. Denis Hughes (Hydrology and interim Director), Mrs. Lil Haigh (Wetlands) and Dr. Nikite Muller (Environmental Water Quality). "To replace Jay and Tally, we are looking for enthusiastic researchers who will join us with new ideas and lots of energy" said Prof. Hughes. "The core team of senior research staff will provide the continuity, and we hope that Jay and Tally will be a link to new opportunities for expansion of existing activities". It is a credit to the strength and profile of fresh water research in South Africa, and particularly in the Eastern Cape, that local researchers are sought after by top-flight research organisations world-wide.

CSIR Warns Against Fluoride in Water

Richard Davies from the *Pretoria News* reports that the Council for Scientific and Industrial Research warned recently about plans to add fluoride to South Africa's drinking water, saying it posed a possible health risk to people with HIV and Aids, as well as those suffering from malnutrition.

According to the report, Bettina Genthe, a water analysis expert with Environmentek, a business unit of the CSIR, briefed Parliament's water affairs portfolio committee and said recently enacted legislation prescribed the addition of fluoride to water to stop tooth decay.

She said: "We've got a number of factors which affect the health impact of fluoride in this country - one of these is that malnutrition makes fluoride more toxic than it is to people who are well nourished.

"So this is a factor we would have to consider before going ahead and adding fluoride to the water supply."

There was also the potential danger of fluoride compromising people's immune systems.

In an obvious reference to the Aids pandemic, Genthe said "a large percentage of the population in South Africa already have a compromised immune system; this (fluoridation) just adds more fuel".

"Maybe we shouldn't be going at it in this particular way. There is no doubt that fluoride is good for teeth, and it protects against decay ... but water fluoridation might not be the best way of achieving this protection," she told MPs.

Speaking after the briefing, Genthe said fluoridation was "potentially a problem" for people with HIV.

"It's potentially a problem; we're not 100% sure. Not on humans specifically, but in the test tube ... it appears to be that fluoride can be toxic at very low concentrations to immune system cells."

However, it was very difficult to prove a link, because other factors had first to be eliminated.

"The animal studies and the cell studies are showing that there's a potential problem, and we haven't proven it yet."

However, she would rather "err on the side of safety".

"If we think something is potentially harmful or toxic, especially with malnourished people. I think we need to hold off.

"The benefits of protecting people's teeth compared to potentially affecting their whole body ... I don't think it's the right way to go, until we know more. There's too many gaps in the scientific data," she said.

Asked if the CSIR was planning to issue a warning to municipalities, advising them to hold off on plans to fluoridate their water, Genthe said the council's views were contained in a report by the Water Research Commission, which had been available since the beginning of the year.

As far as she knew, none of South Africa's municipalities had started adding fluoride to their drinking water systems.

Water Demand Management Training In Zambia

Pilot presentation of the Guide-line Training Module for Water Demand Management for Municipal Water Supply Agencies successfully conducted in Lusaka, Zambia 19-23 July 2004.

Thirty-six participants drawn from nine southern African countries recently attended the first-ever regional presentation of the water demand management Guidelines Training Module for municipal water supply agencies.

The workshop, which took place at the conference facility of the Holiday Inn in Lusaka, Zambia from 19-23 July 2004, was organised by the World Conservation Union, also known as IUCN, and facilitated by the Training and Instructional Design Academy of South Africa (*TIDASA*) and the Botswana-based Centre for Applied Research. A local water demand management expert from the University of Zambia, School of Mines, co-facilitated the training.

The water demand management guidelines training module for municipal water supply agencies is an outcomes-based, learner-friendly training module that is primarily based on *Building Awareness and Overcoming Obstacles to Water Demand Management: Guideline for Municipal Water Supply Agencies,* one of a series of water demand management guidelines developed by the World Conservation Union (IUCN).

The water demand management Guidelines Training Module for municipal water supply agencies and the water demand management Guidelines are products of phase II of the SADC regional water demand management project undertaken by the World Conservation Union (IUCN) with support from its donors, the Swedish International Development Agency (SIDA) and the International Development Research Centre (IDRC). Additional input to the water demand management Guidelines Training Manual for municipal water supply agencies was gleaned from the country studies, research projects, analytical papers, and the Postgraduate Training Module developed during phases I and II of the same World Conservation Union (IUCN) initiative.

Participants and facilitators from nine SADC countries attended a course on water demand management in Zambia.

The Lusaka Water and Sewage Company worked closely with the World Conservation Union (IUCN), *TIDASA* and the Centre for Applied Research, co-facilitating sessions, providing case study information, and organising field visits in and around Lusaka that illustrated some of the typical challenges and benefits of water demand management in the southern African municipal context.

The participants (mainly top and middle level managers from Botswana, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe) were selected from a pool of sector professionals according to criteria of geographical representation, gender and racial equity, and professional background.

The resulting group brought their rich diversity of backgrounds, qualifications and experience to bear on the common water demand management issues and problems experienced by municipal water supply agencies, adding greatly to one another's learning experience throughout the course. Participants committed themselves to an intensive week of facilitated sessions, field visits, and evening work sessions balanced with opportunities for social relaxation, provided by Lusaka's restaurants and night spots.

Each group of participants selected a target city or water supply organisation for which information had been provided by the facilitators or by the participants themselves. They developed tailored implementation plans that outlined the background, needs, constraints, benefits and key performance indicators for the water demand management strategies they proposed.

The impact of the training, not only on the participants but also on their workplaces and the sector as a whole, will be determined in the medium term by a survey that will focus on determining the extent to which the participants have been able to share or put into practice their improved water demand management knowledge within their organisations and wider spheres of influence.

The World Conservation Union (IUCN) is keen and willing to support similar further training and the formation of a fledgling water demand management network within SADC member states and beyond, and together with the International Development Research Centre, the Swedish International Development Agency, *TIDASA*, and Centre for Applied Research invite you to

make suggestions on strategies or opportunities for further training and networking in water demand management.

If you have ideas for further training, would like to become part of the network, or need more information about the module or any other aspect of water demand management, please contact:

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A certificate of attendance is presented to Ms Ngabo Muleba by Dr Daniel Nkhuwa.

Site visit to the Iolanda waterworks, Kafue river, Zambia.

POST BAG

Letters to the Editor

(E-mail: jand@wrc.org.za)

NEW SANCIAHS COMMITTEE

Denis Hughes from the Institute for Water Research, Rhodes University, writes:

As your readers will be aware, the SANCIAHS Committee looks after the interests of South African hydrological scientists and specifically serves as the contact point for international communications from the International Association of Hydrological Sciences and the IUGG. Earlier this year there were several calls for nominations to establish a new SANCIAHS Committee (including one through Water Wheel). While I admit that part of the problem may have been some confusion about dates, the outcome of these calls was a resounding silence! We received no nominations at all.

Given that we need to maintain the Committee and that some existing members were not available in the future, I decided to ask which existing members were prepared to continue and to suggest some other names of people who may be prepared to participate. The result is that the following people constitute the new SANCIAHS Committee, who will hold office until the next SANCIAHS Symposium (Gauteng 2005, look out for announcements in Water Wheel). At that symposium I will call for the IAHS membership in South Africa to ratify the new committee and for nominations for the Chairman and National Representative (I currently hold this position).

Peter Ashton (CSIR)
Jean Boroto (GWP)
Renias Dube (WRC)
Denis Hughes (IWR, Rhodes University)
Graham Jewitt (BEEH, University of KZN)
Wageed Kamish (Ninham Shand)
Simon Lorentz (BEEH, University of KZN)
John Ndiritu (Civil Engineering, WITS)
Roger Parsons (GW Consultant)
Roland Schulze (BEEH, University of KZN)

One of the main tasks of SANCIAHS is to organise the National Hydrology Symposium, held every two years and I would encourage all hydrologists, water resource engineers and scientists from related disciplines to support this symposium. John Ndiritu is leading the organisation of the 12th symposium (Gauteng, 2005) and I am sure that further information and the call for papers will be available in the near future.