New from the WRC

Report No. 1756/1/11

Investigation into the effects of water quality (organic vs. inorganic) on the immune system (E Pool; P Bouic; H du Preez; C Malan & R Hendricks)

Factors that modulate the immune system can have serious consequences for animals and humans because the normal defences against microbes, pathogens and cancers do not function properly. This can result in increased incidences of infections, cancers and allergies. Several chemicals found in the environment, such a oestrogens, polychlorinated biphenyls (PCBs) and the pesticide lindane have immunotoxic properties which affect specific immune defences. The objectives of this study were to validate and implement an assay to monitor the effects of hydrophobic extracts of water on the immune cell populations; validate and implement an assay to monitor the effects of environmental water extracts on inflammatory, Th1 (cell-mediated immunity) and Th2 (humoral immunity) cytokine synthesis and on antibody production. Furthermore, a seasonal study was undertaken on the immune and microbiological quality of the water from the Eerste and Plankenbrug rivers, Stellenbosch.

Report No. 1700/1/12

The impacts of rural small-community water supply interventions in rural South Africa (P Jagals)

Much evidence exists to show that, where communities use poor quality water, improving water supply services such as access, availability and portability generally leads to a significant reduction in morbidity as well as premature mortality from water-related infectious disease. The purpose of this work was to develop an understanding of the socio-economic value of improving water supply services and ultimately produce a framework from which to develop a tool for assessing and monitoring the extent of these benefits.

Report No. TT 534/12

Tool to measure impacts and operations of rural small-community water supplies in rural South Africa (P Jagals)

This report contains descriptions and contents of two rapid assessment tools. Tool 1 is used to measure impacts of rural small-community water supply interventions in rural South Africa, while Tool 2 is used for rapid technical assessment of rural water-supply systems. Water service providers and other interest groups can use these tools to evaluate whether the small-community water-supply systems that they are providing are beneficial for their recipients and, if not, where there will be areas that require improvement.

Report No. 1799/1/12

Water temperatures and the Ecological Reserve (H Dallas & N Rivers-Moore)

Freshwater systems, both globally and within South Africa, are under pressure, and are among the most deteriorated and worst off systems, due in part to water abstraction, flow regulation and pollution. Successful implementation of environmental flow management requires taking cognisance of the full spectrum of flows together with thermal regimes, including their temporal and spatial variability. Water temperature is recognised as an important abiotic driver of aquatic ecosystems, and understanding the role that temperature plays in driving ecosystem change is important if effective management of thermal stress on aquatic ecosystems is to be achieved. Therefore, the main aims of this research project were, among others, to collect baseline water temperature data in a range of rivers in the Western and Eastern Cape; develop a generic water temperature model for South Africa; and to develop an understanding of the response of aquatic organisms to water temperature regimes in South African rivers.

Report No. 1745/1/12 to 1745/3/12

Tackling the challenges of full pit latrines (D Still & K Foxon)

The South African government has constructed over two million ventilated improved pit (VIP) toilets and other on-site sanitation systems since 1994. But with a remaining three million households still without basic sanitation, many water services authorities (WSAs) in South Africa are still focused on addressing backlogs and have not given serious thought to the maintenance of the systems they have already built. Many of the toilets that were first provided in the push to provide basic sanitation for all are expected to reach capacity in

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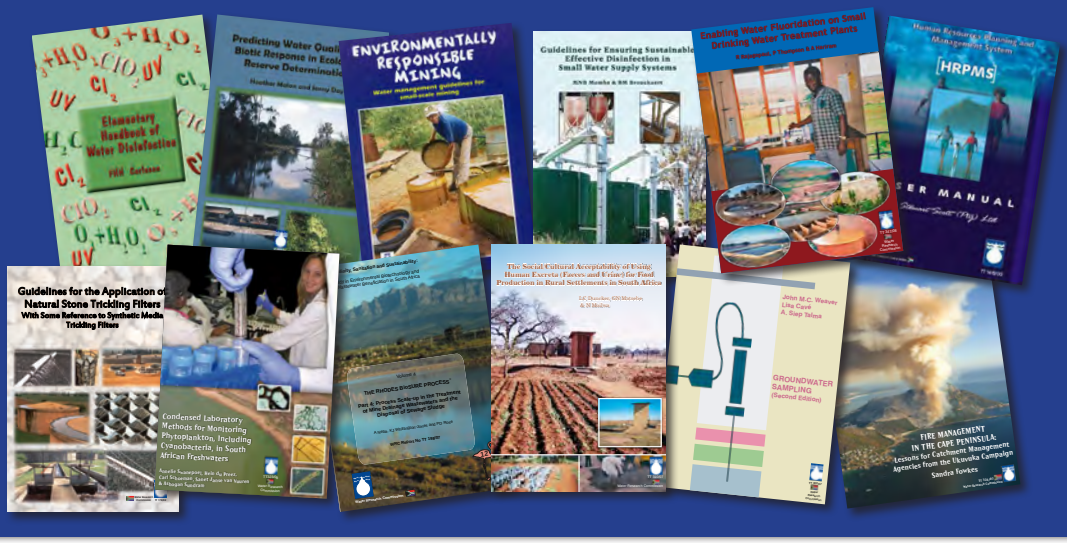
After more than 40 years of serving as South Africa's premier hub for water-centred knowledge, in which 100 research reports are printed a year, on average, the Water Research Commission (WRC) storeroom is throwing open its doors to the public.



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the next few years, which will result in an overwhelming demand for pits to be emptied. Without funds, policies, tools or procedures in place to manage the emptying of pits and disposal of sludge when this happens, many WSAs around the country may soon be facing a crisis. The goal of this project was to investigate existing management practices with regard to VIP toilets, identify challenges and develop strategies and tools for more effective management. Existing literature and current practice was explored to consolidate knowledge on pit filling, strategies and methodologies for pit emptying and the economic aspects of successful on-site sanitation management. New technologies and methods were developed for pit emptying and sustainable alternatives for the beneficial use of sludge were explored. The findings of this research have been published in three volumes, namely *Understanding Sludge Accumulation in VIPs and Strategies for Emptying Full Pits (Volume 1)*; *How Fast do Pit Toilets Fill Up? A Scientific Understanding of Sludge Build Up and Accumulation in Pit Latrines (Volume 2);* and *The Development of Pit Emptying Technologies (Volume 3)*.

Report No. 1887/1/12

Piloting and testing the pour flush latrine technology for its applicability in South Africa (D Still & B Louton)

This project investigated the potential for modifying the pour flush design, which is used widely in Asia, to meet the needs of the South African context. The development and application of pour flush systems in Asia was studied. Three case studies were conducted to investigate the experience of South Africans with low flush systems in the past and related technologies were surveyed. A prototype was developed and tested after which the technology was piloted in 20 homes for usage periods of up to 18 months. The systems were monitored over the course of the project and performance and user experience were assessed at the end of the project.

Report No. 1988/1/12

Bridging the policy divide: Women in rural villages and the Water for Growth and Development Framework (L Loate; V Molose; S Motloung; V Munnik; I Wilson & K Zuma)

This study was focused on the implementation of water legislation and policies on the ground, evaluating whether the intentions of the Water for Growth & Development Framework to bring water services and water resources together in support of women as strategic users of water and, in particular, rural women's use of water for their emerging productive activities, are met in reality. Among others, the study examined the extent to which local authorities meet their developmental mandate to promote local economic development by supporting rural women multiple uses of water. The study demonstrates rural women's strategies for multiple uses of water and ways in which policies and their implementation at national and, in particular, at local level, better support them.

Report No. 1926/1/12

Water use of the dominant natural vegetation types of the Eastern Shores area, Maputaland (AD Clulow; CS Everson; C Jarmain & M Mengistu)

In South Africa much of the focus on total evaporation (ET) related work in water research has been on alien vegetation due to its high water use and impact on the environment. There is a dearth of information on ET from natural vegetation and, in particular, indigenous trees. This is compounded by variable climate and there is a poor understanding of how far previous research results can be extrapolated to other climatic regions. During the course of two previous WRC-funded projects a need was identified to determine the water balance of the Eastern Shores area of the iSimangaliso Wetland Park. It was, however, apparent that there was little or no information on the actual ET from the different vegetation types of the area. Because ET is such a dominant component of the water balance, there was therefore a critical need to determine and better understand the ET of this vulnerable and protected area in order to improve the management of the system.

Report No. 2016/1/12

Evaluation of sanitation upgrading programmes – The case of the bucket eradication programme (NP Mjoli)

The majority of municipalities used the conventional waterborne sanitation system to replace buckets in urban formal settlements. This presented a challenge for municipalities servicing areas with bulk sewers and inadequate wastewater treatment capacity and, in some cases, the available water supply could not support the new waterborne sanitation systems. This study was initiated to assess what worked and what did not work, to evaluate the extent of compliance of the bucket eradication programme with sanitation policy principles and to assess the impact of the programme on the quality of life for the beneficiary communities.

Report Nr. KV 297/12

Silver/zeolite nano composite-based clay filters for water disinfection (L Petrik; R Missengue; O Fatoba; M Tuffin; J Sachs)

People who do not receive a supply of treated potable water rely on natural groundwater or surface water resources which in the absence of sanitation systems are often contaminated with pathogenic microorganisms of faecal or other origin. Point-of-use (i.e. household) treatment devices offer the most potential to minimise the risks of waterborne disease in such situations. Clay or ceramic filters for household water treatment have been available since the 1980s and their efficacy has been investigated. However, such studies usually assess filters that are produced commercially and are beyond the budget of the intended end users, prompting other workers (e.g. the Potters for Peace organisation) to investigate filters which employ local people and locally available materials in their fabrication. This project investigated the possibility of enhancing the Potters for Peace innovation with the addition of silver/zeolite for added disinfection.

Report Nr. 1647/1/12

Managing salinity associated with irrigation at Orange-Riet and Vaalharts irrigation schemes (LD van Rensburg; JH Barnard; ATP Bennie; JB Sparrow & CC du Preez)

Salinity associated with irrigation has in the past, and continues to be arguably the most important factor threatening agricultural production under irrigation. Unfortunately the problem extends beyond the confines of irrigated fields, degrading water resources and resulting in extensive areas of land becoming waterlogged and saline. Poor planning and ineffective water and salt management practices by farmers and managers of irrigation schemes therefore strongly affect the sustainability of irrigation. Researchers are in agreement about the fact that sustainable irrigation is technically possible with the proper design and operation of irrigation and drainage systems, with the implementation of suitable crop and soil management practices, provided that acceptable political and social structures are in place. The general opinion is that irrigated agriculture will not only survive, but will indeed thrive under realistic circumstances and appropriate management practices. The estimated fraction of salt-affected irrigated land in South Africa is only 9%, which is much lower compared to countries such as Argentina, Egypt, Iran, Pakistan and the USA where percentages as high as 34% are experienced. Despite the fact that salt-related problems are not at present a significant factor threatening production under irrigation in South Africa, increasing evidence of deterioration of physical resources suggests that the problem cannot be ignored. A solicited research project on managing salinity associated with irrigation in selected areas of South Africa was therefore introduced by the Water Research Commission.

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