

## CURRENT RESEARCH, DEVELOPMENTS, PROJECTS AND PROGRAMMES FOR WATER RESEARCH COMMISSION (WRC)

Title	Aim	Contact	Role-Players	Time Frames	Comments / Notes
<p>Measurement of the bulk flow and transport characteristics of selected fractured rock aquifer systems in South Africa (S)</p> <p><b>1760</b></p>	<p>In South Africa, more than 90% of the aquifers are of a fractured nature. The physical properties of geologic materials exert a significant influence on the storage and ability of fluids to move through them. The existing theory of flow cannot fully account for flow through fractured rocks. Field-scale studies and direct observations/measurements are the most robust means of developing and calibrating models of flow and transport in fractured rock aquifers. As a result these fractured aquifer systems can be better exploited and managed through:</p> <ol style="list-style-type: none"> <li>1. Developing appropriate innovative methodologies/approaches to measure bulk flow and transport characteristics of fractured rock aquifers and of up-scaling those to appropriate scales and resolution; and</li> <li>2. Developing guidelines for future well-field developments in fractured aquifers</li> </ol>	<p>Dr. Shafick Adams</p> <p>+27 12 3309071</p> <p><a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2007-Mar/2011</p>	

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<p>The identification and delineation of high-yielding well-field areas in Karoo aquifers as future water supply options to local authorities.(S) <b>1763</b></p>	<p>There have been a number of recent initiatives to quantify and delineate high groundwater potential areas, but they have either been based on inadequate data, or have fallen short in providing the necessary information that can readily be used by planners. This project will address two main issues: 1. Identify and quantify useable high groundwater potential areas in the Main Karoo Basin (through specific case studies); and 2. Develop the framework for incorporating the high potential areas into the municipal, catchment and national planning models. This will allow for water resource planning at all levels to properly take into account groundwater as a bulk water source. The project will focus on the Main Karoo Basin, but the methodologies developed will be applicable to all Karoo aquifers.</p>	<p>Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2007-Mar/2011</p>	
<p>Field investigations to study the fate and transport of light non-aqueous phase liquids (LNAPLs) in groundwater(S) <b>1766</b></p>	<p>The programme outputs will establish an improved understanding of the origin of pollutants, the pathways which these pollutants could follow into the environment and the ultimate fate of these pollutants (LNAPLs). This project will produce tested techniques and guidelines for application in the industry. Available approaches are usually based on international case studies dealing mostly with porous aquifers. South African specific case studies will enable a better understanding of the behaviour of LNAPLs in the subsurface with a specific emphasis on fractured rock environments</p>	<p>Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2007 - Mar/2011</p>	

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<p>Optimised monitoring of groundwater - surface water - atmospheric parameters for enhanced decision making at a local scale (S) <b>1846</b></p>	<p>The primary objective of this research will be to develop a framework for optimized monitoring of the most important variables required to manage groundwater resources and understand the fluxes between atmosphere – soil – groundwater – surface water systems at a local level. The secondary objectives: 1) Understanding the institutional and legal interactions of different agencies responsible for various monitoring programs. 2) Develop guidelines for monitoring best practices applicable to South(ern) African conditions and 3) Develop a framework for the monitoring of the different fluxes so that they are closely measured in time and space, where applicable</p>	<p>Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2008 - Mar/2011</p>	
<p>Nitrate removal for groundwater supply to rural communities (NS) <b>1848</b></p>	<p>The main contribution of this project will be the design criteria for a range of in-situ and ex-situ treatment alternatives for the specific needs for rural communities. Investigating applicable identification systems in specific circumstances (i.e. rural communities, town water supply and stock water watering, etc).</p>	<p>Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2008 - Mar/2009</p>	

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<p>Development and Application of Global Navigational Satellite Systems (GNSS) Methodology for Groundwater Resource Assessment (NS)</p> <p><b>1851</b></p>	<p>This project will 1) Demonstrate the use of high-precision GNSS technology as a tool for groundwater resource monitoring and assessment; 2) Develop a methodology for relating GNSS measurements of natural or abstraction-induced surfacede formation and conjunctive hydrogeological data in order to derive the in-situ, bulk elastic. This project will 1) Demonstrate the use of high-precision GNSS technology as a tool for groundwater resource monitoring and assessment; 2) Develop a methodology for relating GNSS measurements of natural or abstraction-induced surfacede formation and conjunctive hydrogeological data in order to derive the in-situ, bulk elastic properties of an underlying confined fractured rock aquifer and 3. Build South African capacity to establish the technical infrastructure and implement the data-processing methods required for pilot GNSS-for groundwater scheme at the Gateway well field, Hermanus properties of an underlying confined fractured rock aquifer and 3. Build South African capacity</p>	<p>Dr. Shafick Adams</p> <p>+27 12 3309071  <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2008 - Mar/2011</p>	
<p>The use of isotope hydrology to characterise and assess water resources in South(ern) Africa (s)</p> <p><b>1907</b></p>	<p>This project will be used to assess the water resources of selected areas, building on new, existing and earlier, uncompleted studies, information and data. The other main aim is to re-establish and develop the required capacity to analyse and interpret isotopic data and information. This will be achieved through the re-interpretation of available isotope data in South(ern) Africa as well as developing new studies, whereby the usefulness of isotope hydrology is demonstrated.</p>	<p>Dr. Shafick Adams</p> <p>+27 12 3309071  <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2009 – Mar/2012</p>	

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<p>Reducing Uncertainties of Evapotranspiration and Preferential Flow in the Estimation of Groundwater Recharge (NS) <b>1909</b></p>	<p>This project proposes to develop improved process-based estimates of groundwater recharge. Attention will be focused on the determination of two important components of the water balance, in particular evapotranspiration and water movement through preferential flow. Improved recharge determination will allow more accurate estimates of associated processes, like for example transport and transformation of possible contaminants, leaching, etc., as well as predictions of possible climate change impacts on the groundwater resource. The main outcome will be to develop improved methodologies for the estimation of recharge, by reducing uncertainties in evapotranspiration estimates and preferential flow.</p>	<p>Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2009 – Mar/2012</p>	
<p>The Hydrogeology of Groundwater Region 10: Karst Belt (s) <b>1916</b></p>	<p>The following reports in this series have thus far been published by the WRC: Region 1 (Makoppa Dome) and Region 3 (Limpopo Granulite-Gneiss belt) in 2000, Region 7 (Polokwane/Pietersburg Plateau) and Region 19 (Lowveld) in 2003, and Region 26 (Bushmanland) in 2007. The Karst Belt, also referred to as Region 10, has been identified as the next region for which the current state of hydrogeological knowledge should be documented. This region was selected for the following reasons: (a) the importance of the dolomitic/karst aquifers as potential sources of good quality groundwater in large quantities, (b) the vulnerability of these groundwater resources to contamination from a wide range of human and land use activities, and (c) the need to collate in a single reference a synthesis of the current knowledge and understanding of these hydrogeological systems.</p>	<p>Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a></p>	<p>Water Research Commission (WRC)</p>	<p>Apr/2009 - Mar/2011</p>	

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Groundwater Management Function(s) <b>1917</b>	Strengthening the capacity of the catchment-based authorities, to manage groundwater effectively, is an important challenge. This can be achieved by identifying local needs and trends, facilitating communication and cooperation, and promoting best management practices. The success of any groundwater management plan depends on the effectiveness of the authorities that are responsible and is also a prerequisite for integrated water resource management. The main aims of this project are: (1) Define the functions of planning, organizing, directing and control, in terms of groundwater management; (2) Develop and incorporate the appropriate management functions into a groundwater management framework for improved resource management, targeting local municipalities, and (3) To establish the value of groundwater for different users and to determine a tariff strategy for groundwater which will consider both the actual supply costs (fixed and variable) and the value of water.	Dr. Shafick Adams +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a>	Water Research Commission (WRC)	Apr/2009 - Sep/2010	

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Investigation of the fate and trans-port of selected microorganisms in two simulated aquifer conditions in the laboratory and in the field (s) 1905	The detailed behaviour of micro-organisms in groundwater is not well understood. There are many kinds of micro-organisms and many processes that affect their fate and transport and these vary from one aquifer type to another. The National Microbial Monitoring Programme for groundwater has been developed for DWAF. Besides the movement of the groundwater, there are processes such a natural die-off, formation of biofilms, adsorption, etc., that are taking place and there is no good local understanding of the nature and extent of the chemical, physical, biological and microbiological processes that control the fate and transport of micro-organisms in South African aquifers. This project aims to develop a sound database and monitoring protocol upon which future comprehensive fate and transport modelling of micro-organisms in dolomitic aquifers can be based, that would enable more detailed modelling (inevitably scenario-based) and could contribute significantly to the development of appropriate strategies that mitigate associated human health risks.	Annatjie Moolman	Water Research Commission (WRC)	2009-2012	
Groundwater-surface water interactions along the Luvuvhu <b>4031/883</b>	As per the title	Dr. Shafick Adams +27 12 330 9071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a>	Water Research Commission (WRC)	2009-2010	

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Updating and revision of current groundwater reserve methodologies (GRDM) <b>4031/891</b>	As per the title	Dr. Shafick Adams +27 12 330 9071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a>  N. Motebe  +27 12 336 8073 <a href="mailto:moteben@dwa.gov.za">moteben@dwa.gov.za</a>	Water Research Commission (WRC) in collaboration with  Department Water Affairs (DWA)  Chief Directorate: Resource Directed Measures (CD: RDM)	2009-2010	
Updating Creating a map of stable isotopes in tap water across South Africa for hydrological, ecological and Forensic applications <b>4031/892</b>	To create a map of the stable isotopic composition of tap water across South Africa. To provide this information — free-of-charge — on the internet for use by managers and researchers. To train undergraduates in stable isotope chemistry and instill an interest in water isotope research	Dr. Shafick Adams  +27 12 3309071 <a href="mailto:shaficka@wrc.org.za">shaficka@wrc.org.za</a>	Water Research Commission (WRC)	2009-2010	