

# Groundwater Crucial to Rural Development

*Groundwater, if developed and managed responsibly, has a crucial role to play in providing potable water to communities, reports Dr Kevin Pietersen, water resource management director of the Water Research Commission (WRC).*

Speaking at the 2005 Biennial Groundwater Conference in Pretoria, he said that groundwater is an important drinking water supply source to many, especially rural, communities in South Africa. It is estimated that more than 400 communities in the country are

dependable on groundwater for domestic purposes.

The main method of abstracting groundwater is by means of boreholes. Incidentally, a successful borehole in South Africa is defined as one with a yield of more than 0,1  $\ell/s$ .

This is sufficient to supply a small rural community using a handpump.

According to Pietersen, groundwater has much potential in serving communities in areas where water infrastructure does not exist, and where water delivery is difficult due to arid conditions. In the Eastern Cape, for example, suitable high-yielding boreholes have been found associated with dolerite-ring and sill-complexes.

Traditionally, there has been a tendency to focus only on the short-term physical sustainability in providing basic water services to these communities. This includes the selection of a favourable site, the right type of pump and the type of well or borehole.

However, Dr Pietersen pointed out, this is not enough for the long term. For marginalised communities to improve their quality of life issues such as supplying enough water for productive use rather than just subsistence use should be considered. Communities should be involved and take ownership of their water resources. At the same time, the role of groundwater in maintaining the natural and economic resource base in the community; and the sensitivity of these systems to overexploitation should not be overlooked.

## FIT FOR USE

Unfortunately, not all types of groundwater are fit for use. Diarrhoeal diseases can result from drinking borehole water that contains viruses, bacteria, protozoans and helminths.

### GROUNDWATER IN SOUTH AFRICA



Groundwater currently contributes between 13% and 15% of the total water use in South Africa. It is estimated that the total groundwater use for the country is about 300 million cubic metres a year. The total harvest potential for the country is estimated at 19 000 million cubic metres a year.

According to Dr Peter Rosewarne of SRK, the main method of abstracting groundwater is by means of boreholes. In rural areas with extensive but generally low-yielding aquifers, such as the Karoo, the wind pump is a familiar sight. Less conspicuous are the higher yielding boreholes equipped with submersible or turbine pumps supplying irrigation, urban, mine

and industrial requirements. In fact, it is estimated that there may be more than 1,1 million water yielding boreholes in the country.

The most favourable areas or aquifers regarding groundwater availability include the dolomites of the West and Far West Rand; Table Mountain Aquifers of the Western and Eastern Cape; and the coastal sand aquifers in the Western and Eastern Cape and northern KwaZulu-Natal. Other high-yielding aquifers include basement granites in the Polokwane-Dendron-Coetzerdam area, alluvial deposits along sections of large rivers such as the Limpopo and parts of the Karoo Sequence associated with dolerite dykes and ring structures.

In fact, reports Dr Rosewarne, potable groundwater is available over most of South Africa in sufficient quantities to supply small- to medium-scale domestic requirements, stock watering, and small-scale irrigation. The main area where availability is severely limited is the north-western parts of South Africa.

## MANAGING GROUNDWATER FOR TOMORROW



Dr Ricky Murray, hydrogeologist at Groundwater Africa recommends the following steps for establishing a groundwater management system:

- ◆ Obtain the support and buy in of the Water Services Authority (WSA). It is usually the local or district authority.
- ◆ Identify boreholes that are registered, and those that require registration.
- ◆ Identify priority monitoring sites from the WSA, catchment management agency, Department of Water Affairs & Forestry and other organisations.
- ◆ Prioritise monitoring sites from the above list.
- ◆ Define the monitoring objectives for each borehole.
- ◆ Identify and inform role players.
- ◆ Develop the project plan and budget.
- ◆ Define job descriptions.
- ◆ Secure funding.
- ◆ Implement the priority sites.
- ◆ Provide mentorship.
- ◆ Evaluate and make recommendations.

"In order for the water resources (the aquifers) to be managed in a sustainable and environmentally acceptable manner the following needs should be set up: water level, water quality and abstraction monitoring; data capture; data analysis; operational changes based on the data analysis; and reporting," notes Dr Murray.

*Groundwater can play an increasingly important role in bringing basic water supply to far-flung communities.*



In this regard a national microbial monitoring programme for groundwater is being implemented. The objectives are to measure, assess, and report on a regular basis the status and trends of the microbial water quality of South African groundwater resources.

Human health can also be affected by long-term exposure to either an excess or a deficiency of certain chemicals in groundwater. This includes iron, copper, zinc, cobalt, magnesium, chromium, and selenium.

These contaminants can be the result of industrial activities, for example, the unknown volume of hexavalent chromium (the cancer-causing chemical made famous by the movie *Erin Brokovich*) that was found in the groundwater outside the Bayer chemical factory in Durban.

Groundwater in South Africa often has high nitrate values, which can exceed 50 mg/l (the maximum permissible level of nitrate in drinking water in South Africa is 20 mg/l). This can cause a number of health concerns, including spontaneous abortion or still birth, gastric and other cancers, and hypertension. This nitrate either occurs naturally in the groundwater or it can be the cause of pollution, for example, effluent from industries.

Nitrate removal technologies have been developed and are in use in some parts of South Africa, for example in the northern parts of Limpopo, the Springbok Flats and the Namaqualand. However, it is reported that present denitrification technology is either user unfriendly, inefficient or expensive for developing nations. Efforts are underway at present to improve the situation.

## COPING STRATEGIES

It is clear from these examples that while groundwater plays an essential part in the government's strategy to supply basic water services to all by 2008, innovative thinking will be required to develop groundwater resources and, at the same time, ensure responsible use and protection of human health, said Pietersen. This includes involving appropriate users in technology selection (especially women and children); facilitating democratic decision-making models; and developing groundwater management strategies. In addition, measures must be in place to protect the aquifer from threats. "We must also develop groundwater monitoring and protection systems that address not only environmental issues, but also health and service delivery considerations," noted Pietersen. "With implementation of these strategies groundwater can go a long way in providing water for basic human needs," he concluded.

