

Regional groundwater management

Southern African groundwater sector gets new champion

Groundwater management in southern Africa has received new impetus following the launch of the Southern African Development Community Groundwater Management Institute (SADC-GMI) in Gauteng earlier this year. The institute is working within the 15 members states to collaboratively strengthen the management and development of groundwater for social and economic development in the region.

Article compiled by Lani van Vuuren.



Containing 9% of the world's water resources and 11% of the world's population, sub-Saharan Africa is not necessarily 'water poor'. However, the region faces numerous water-related challenges that threaten economic growth and jeopardise livelihoods.

Traditionally, the development and management of water resources in SADC has focused on surface water. However, there has been a realisation in recent years of the important role groundwater can play in the socio-economic development of the region not only as a local source for rural communities, but

also as a feasible resource for bigger settlements.

Some member states, such as South Africa, have actively integrated groundwater into their water resource management policies and laws, but generally groundwater does not feature prominently in institutional frameworks to manage water at both national and transboundary levels. It is increasingly acknowledged, however, that regional approaches to the management of shared waters can provide improve water security and more sustainable management.

Aquifer types of the SADC region

- **Unconsolidated intergranular aquifers** – Examples include the Mushawe alluvial aquifer in the Limpopo River basin and the extensive shallow aquifer of the quaternary alluvial plain in the Democratic Republic of Congo
- **Fissured aquifers** – Aquifer systems associated with Karoo formations are found extensively throughout the SADC-region. The formations normally have low permeability and are generally low-yielding. The Cape Fold Mountains of South Africa are also associated with fractured rock aquifers.
- **Karst aquifers** – Karst aquifers are water-bearing, soluble rock layers in which groundwater flow is concentrated along secondary enlarged fractures, fissures, conduits and other interconnected openings. Extensive use is made of karst aquifers in Botswana, Namibia, South Africa, Zambia and Zimbabwe.
- **Layered aquifers** – The Kalahari/Karoo aquifer system shared between Botswana, Namibia and South Africa is an example of a layered aquifer. In the Stampriet Artesian Basin there are two confined regional artesian aquifers in the Karoo sediments, overlain by the Kalahari sediments that often contain an unconfined aquifer systems.
- **Low permeability formations** – Low permeability formations are normally associated with basement aquifers. These formations occur extensively throughout the SADC-region.

Source: Position paper: Groundwater management in the Southern African Development Community

The many challenges that face the region – particularly in the water sector – are best addressed through cooperation and integration at the regional level. Strengthening regional initiatives and institutions can also contribute to ending poverty and promoting shared prosperity.

Groundwater occurrence in southern Africa is characterised by a large variety of geological structures and climatic differences that condition the regional hydrogeological settings. Up to 65% of the SADC is covered by crystalline rocks with aquifer systems developed in the weathered regolith and fractured bedrock.

The aquifers developed in these areas are largely unconfined, locally developed and not spatially extensive. While large-scale groundwater well-field developments are not feasible, modest groundwater supplies can be abstracted.

It is estimated that SADC member states have a total of 2 491 m³/capita/annum in renewable groundwater – this is more than what is available in Europe or Asia. Yet, only 1.5% of groundwater

is currently utilised. This small percentage of groundwater use is stretching far, however. This creates enormous opportunity for further development.

Groundwater does play a significant role in especially rural water supply in southern Africa, being the only water source for up to 70% of the SADC population of 250 million people. Even the region's capital cities, such as Tshwane, Lusaka, Dodoma and Windhoek, are partly dependent on groundwater for their water supply.

Groundwater also plays an important role in supporting food security in the sector. In Angola, for example, groundwater irrigation is important in areas where the rainfall is not sufficient for crops and where rivers are unreliable. In Zimbabwe, alluvial aquifers associated with the Shashani River, a tributary of the Limpopo River, supply water to a number of irrigation schemes.

Many ecosystem services have a direct linkage with groundwater storage, recharge and discharge in southern Africa. The interaction between surface water and the groundwater strongly influences the structure and function of the Okavango wetland ecosystem in northwestern Botswana. The cycling of seasonal floor water through the groundwater reservoir plays a key role in creating and maintaining the biological and habitat diversity of the wetland, and inhibits the formation of saline surface water.



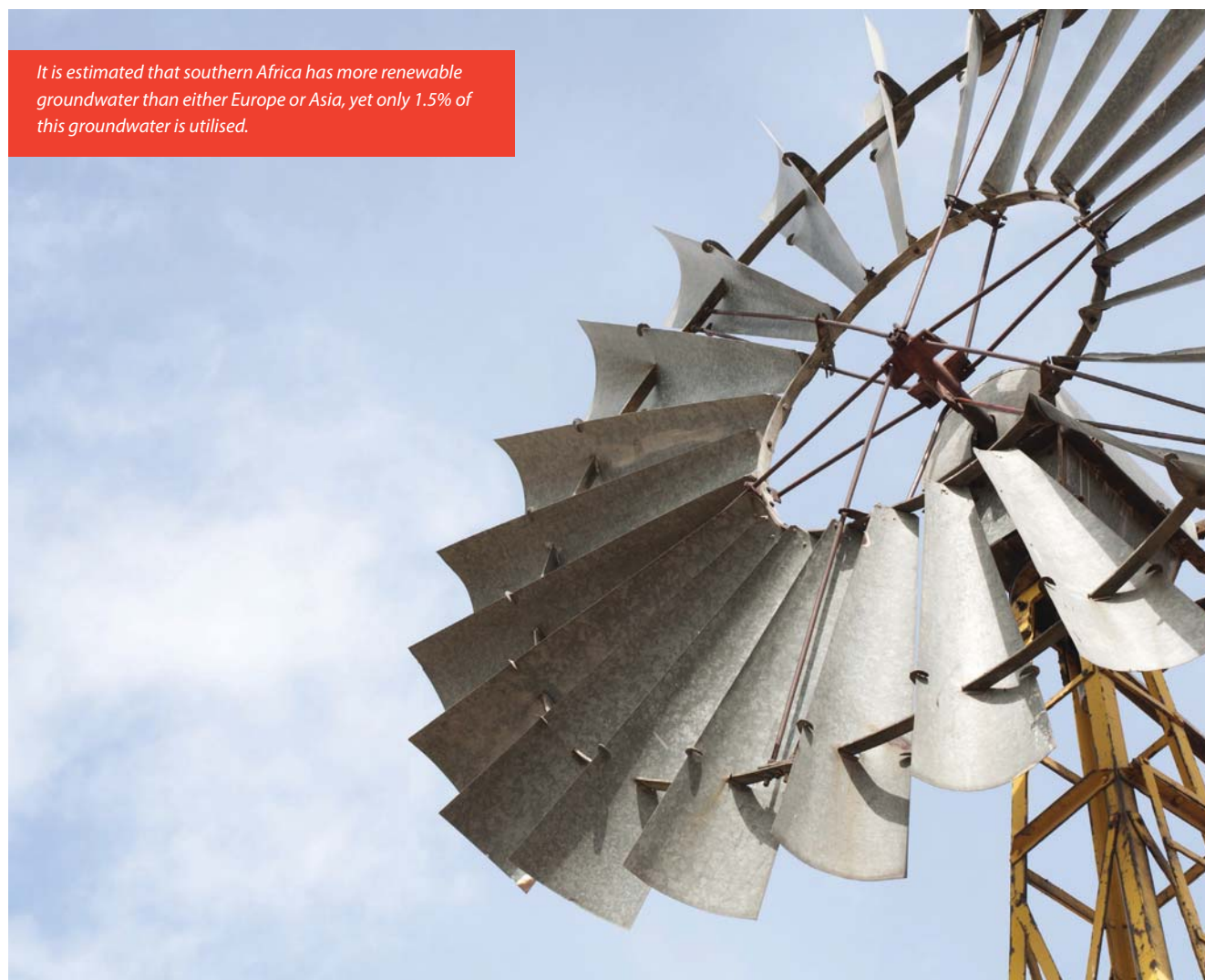
An estimated 70% of the 250 million residents in southern Africa are dependent on groundwater for their daily water requirements.

SADC members – Groundwater availability in terms of total water availability

Country	Total water availability (surface and groundwater)	Groundwater availability (as % of total water availability)
Angola	5 915 m ³ /capita/annum	23%
Botswana	5 410 m ³ /capita/annum	20%
Democratic Republic of Congo	16 605 m ³ /capita/annum	12%
Lesotho	1 415 m ³ /capita/annum	4%
Madagascar	13 905 m ³ /capita/annum	10%
Malawi	1 004 m ³ /capita/annum	17%
Mauritius	2 179 m ³ /capita/annum	Very small fraction
Mozambique	7 760 m ³ /capita/annum	10%
Namibia	7 207 m ³ /capita/annum	11%
Seychelles	Not calculated	
South Africa	910 m ³ /capita/annum	10%
Swaziland	3 504 m ³ /capita/annum	9%
Tanzania	1 800 m ³ /capita/annum	22%
Zambia	6 489 m ³ /capita/annum	18%
Zimbabwe	1 282 m ³ /capita/annum	8%

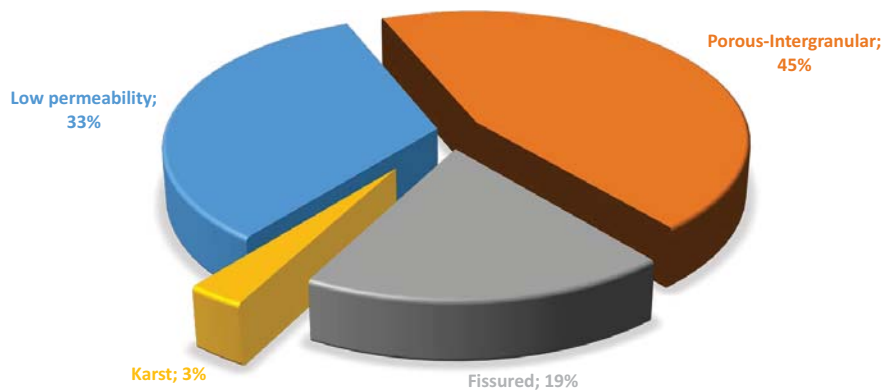
Source: Position paper: Groundwater management in the Southern African Development Community

It is estimated that southern Africa has more renewable groundwater than either Europe or Asia, yet only 1.5% of this groundwater is utilised.





Large southern African capital cities, such as Pretoria and Windhoek, are at least partially dependent on groundwater.



Groundwater occurrence in SADC (Source: Position paper: Groundwater management in the Southern African Development Community)

There have been numerous efforts to understand and manage groundwater in SADC in recent years, involving both regional and international organisations. These include, for example, the Transboundary Water Management in SADC Programme (2005-2015), led by GIZ with other funding organisations; the Groundwater and Drought Management Project (2009) supported by the World Bank, the SADC Hydrogeology Map and the SADC Groundwater Grey Literature Archive.

The SADC-GMI intends to build on these and other achievements related to groundwater management in the region. The initiative is promoting sustainable groundwater management and solutions to groundwater challenges in the region through, among others, building capacity, providing training, advancing research, supporting infrastructure development, and enabling dialogue to exchange groundwater information.

According to SADC-GMI Director, James Sauramba, the challenges of climate change, pollution and rapidly growing water demand in southern Africa make building a sustainable groundwater management programme in the SADC member states critical for the region's future development. His vision for the institute is to ensure that groundwater management issues are granted equal priority in national and international water

management discourses, and prominently featured in water legislation and policies in southern Africa.

At the same time, he wants the SADC-GMI to substantially elevate cooperation on shared aquifers in the region, in alignment with the revised SADC Protocol on Shared Water Courses. "There are over 30 identified shared aquifer systems across southern Africa and member states often share similar groundwater challenges," noted Sauramba. "Managing and developing these in a sustainable manner will positively contribute to the social and economic development of the people residing within the region."

SADC-GMI is managed by the SADC Secretariat, and is hosted by the Institute for Groundwater Studies at the University of the Free State. Finance is being provided by World Bank and the multi-donor trust fund, Cooperation in International Waters in Africa (CIWA).

It is expected that the institute will go a long way towards creating a regional platform for knowledge sharing and cooperation on the sustainable management of southern Africa's groundwater resources.

To find out more, Visit: www.sadc-gmi.org