Declaration of Strategic Water Source Areas as Protected Areas: towards South Africa’s water security

Minister, access to clean water is a basic human right and is also the life source of South Africa’s economy. As a generally water scarce country, South African depends greatly on the water from its strategic water source areas (SWSAs) – those regions which supply a disproportionately high amount of the country’s water in relation to their size.

In this Water Research Commission (WRC) project, scientists used hydrological and run-off data to map the areas that produced most of the country’s water resources, for example water in streams, rivers, groundwater and wetlands. It was found that the regionally strategic water source areas make up only 10% of the land area of South Africa, Lesotho and Swaziland, yet they provide 50% of our water. Therefore, these areas are a key asset to the continued water security for the country and they need to be protected.

Only 11% of these areas receive some form of formal protection. There is a need to look closely at the development plans in these areas to ensure we maintain and increase the benefits they provide.

The study has also shown that the water produced by these areas supports at least 50% of the population, 64% of the economy and supplies about 70% of the water used by irrigated agriculture. Gauteng gets about 65% of its water from these areas, and Cape Town and eThekwini about 98%. The project also, for the first time, provided information on strategically important groundwater source areas.

Background

Water source areas are traditionally those surface water areas that produce relatively large volumes of runoff which sustain lowland areas downstream. This study built on previous research funded by WRC in partnership with WWF-SA and CSIR which identified 21 strategic water source areas that covered 8% of South Africa and supplied 50% of the mean annual runoff. These water source areas were included in the 2013 National Water Resources Strategy (NWRS) as areas needing protection for continued water security.

Groundwater was not included in the 2013 study although it is an important, and often the only, reliable water source in much of South Africa. This study, through extensive consultation with stakeholders, redefined what is meant by a water source area to include groundwater, and has identified a number of strategic water source areas for groundwater.

The primary outputs of the study are an integrated report, a management framework and implementation guidelines for planners and managers, which provide information on policy, legislation and other measures relating to the protection and management.

South Africa’s water source areas

Water source areas are places or areas which produce disproportionately greater volumes of water per unit area than other areas. This can be because of climatic conditions such as high rainfall, or physical properties such as the ability of the soils and underlying weathered material and rocks to store water as groundwater.
This study identified 22 surface water (Figure 1) and 37 groundwater source areas (Figure 2) that are considered to be strategically important at the national level for water and economic security for South Africa. They include portions of water source areas which extend into Lesotho and Swaziland.

This project identified a total of 124 075 km$^2$ (or 10% of the area) as water source areas in South Africa (Figure 3). Together, these areas provide 24 954 million m$^3$/year or 50% of South Africa’s mean annual runoff. The greatest volume of mean annual runoff is generated by the southern Drakensberg (9% of mean annual runoff) followed by the Eastern Cape Drakensberg, Northern Drakensberg, Maloti Drakensberg and the Boland. The Boland has the highest mean annual runoff per unit area (2 588 m$^3$/ha/year), followed by Table Mountain, the Northern Drakensberg and the Mpumalanga Drakensberg (see Figure 1).

The newly-defined strategic water source areas for groundwater (Figure 2) cover around 9% of the land surface of South Africa. Groundwater sources have a key role in sustaining many towns, industry and irrigated agriculture. Some of the high-yielding surface water source areas are located in areas where baseflow is at least 11-25 mm/year, evidence of a strong link between groundwater and surface water in these areas. The aquifers are sustaining baseflow, contributing to runoff and especially to dry season flows. Sustained river flows are important because they support people and communities who depend directly on rivers for their water, especially during the dry season and droughts.
Benefits and protection of water source areas

There are many water-related benefits that society obtains from water source areas, including water for urban and industrial purposes, and for irrigation. Water from water source areas are also critical for cooling at the power stations which generate most of South Africa's electricity.

It is important to note that the major urban centres of South Africa source more than 90% of their water supply from these water source areas. Furthermore, about 12% of South Africa's population reside within sole groundwater-supply towns or settlements where groundwater provides more than 50% of total supply.

Only 11% of all the water source areas fall within protected areas. For example, only 10% of the critically important Northern Drakensberg source water area, which includes the Upper Wilge and Upper Thukela catchments, is protected. Much of this area is montane grasslands with extensive areas that have been severely degraded by overgrazing. This poses a threat to water security and requires restoration. The best protected water source areas are in the Western Cape, including the Swartberg, Boland and Groot Winterhoek.

Impacts of water flows and quality

The amount of rain water which becomes stream flows or groundwater recharge depends on several factors, including the characteristics of the land and the vegetation growing on it because they affect key processes, including evaporation and infiltration. In general, tall, evergreen vegetation transpires and intercepts more water than short, seasonally green grasslands.

Research has shown that commercial forest plantation species use more water than natural vegetation which is why the extent and location of plantation areas is regulated as a streamflow reduction activity (SFRA) under the National Water Act.

Most of the water source areas are still under natural vegetation, with the lowest proportions being found in Upper Usutu, Mpumalanga Drakensberg and Table Mountain. There is extensive dryland cultivation in several water source areas, including the Upper Vaal, and extensive irrigation in the Boland, Groot Winterhoek, Soutpansberg and Wolkberg.

As expected, plantation forestry is important in the water source areas from KwaZulu-Natal to Limpopo. Mining occupies a relatively small percentage of the area of the surface water areas, but extensive prospecting licenses have been granted, particularly in Mpumalanga where most of the water source areas could be transformed by opencast and longwall coal mining.

Recommendations

The protection and restoration of strategic water source areas is of direct benefit to all downstream users. This dependence needs to be considered in decisions relating to these primary headwater catchments. The protection of...
both water quantity (flows) and quality must be addressed.

Any failure to address impacts on water quality or quantity will have impacts on the water security of all those depending on that water downstream. Groundwater is the main or only source of water for numerous towns and settlements across the country so protecting the capture zone, specifically for municipal supply well-fields, the recharge area, and the integrity of the aquifers is important as well.

The protection and management of strategic water source areas is a responsibility that reaches across many government departments and all spheres of government, the private sector (particularly agriculture and mining) and even the public at large. Strategic water source areas must be recognised and valued by all for the role they play in sustaining the people and the economy of the country. Much can be done to protect, and even improve, the integrity of our strategic water source areas.

The final report suggests actions for various spheres of government, industry and research. Specifically to the Department of Water and Sanitation (DWS) the study recommends that:
- The DWS should address protection measures for both groundwater and surface water in an integrated way, noting that the key components of surface water (e.g. baseflows) depend on groundwater recharge.
- The completion of all water resources classification projects should be prioritised in these areas so that gazetted resource quality objectives are all in place, and the ecological reserve is implemented and enforced.
- Land use practices must be regulated to minimise impacts on water resources in cooperation with other departments and spheres of government.
- Strategic water source areas should be incorporated into the National Integrated Water Information System to inform DWS management decision-making, strategies and plans at national government, as well as at provincial and municipal level.
- Strategic water source areas should also be incorporated into the National Water Resources Strategy (NWRS) and Water & Sanitation Master Plan as a critical issue and high priority for water source management strategies and planning addressing water security issues and the environment.

Accompanying report: Identification, delineation and importance of the strategic water source areas of South Africa, Lesotho and Swaziland for surface water and groundwater (Project no. K5/2431). For content-related queries please contact WRC Research Manager, Wandile Nomquphu [wandilen@wrc.org.za]; Tel: (012) 761-9300.