

April newsletter

National Groundwater Strategy 2010

Newsletter #3: Planning For Water Resources - Groundwater



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Progress with the National Groundwater Strategy

A draft version of the NGS has been completed and subjected to internal and DWA review. This version is now being revised and version 2 is expected to be referred to public scrutiny by August 2010

Additional stakeholder workshops and discussions are planned with both the Mining and Agricultural Sectors and the draft NGS will be used to elicit feedback from interested and affected Government Departments.

Themes In The National Groundwater Strategy

In setting the scene for the full integration of groundwater into South Africa's understanding and use of all available water resources the team preparing the National Groundwater Strategy have provisionally settled on nine key themes. **These are:**

1. Regulation
2. Hydrogeological capacity
3. Finance and pricing
4. Sustainable groundwater management
 1. Groundwater development and use
 2. Groundwater quality management
5. Groundwater research
6. Institutional capacity
7. Information management
8. Water Resources Planning
9. Communication and awareness

This newsletter focuses on groundwater in the process of Water Resources Planning.

Proposed Strategic Objective (Planning Theme)

The NGS proposes the following strategic objective with regard to groundwater planning:

Ensure that groundwater is an integral part of water resources planning across all sectors (bulk supplies, small towns, rural, agricultural, industrial and power generation sectors), and that the potential for extensive groundwater development at both small and large-scale gets serious consideration.

A New Emphasis On Groundwater

Water resource planners have long focused on developing the country's surface water. The argument has been simple and logical: In planning we need to know what we are dealing with; this we can see and quantify in the case of surface water but until the geohydrologists can tell us with some certainty how much groundwater there is to use we cannot plan for it. But we no longer have luxury of leaving groundwater out of the equation and water resource planners are fast shifting towards an inclusive position.

Three things have brought about a fundamental shift in this thinking, and are captured in the NGS:

1. South Africa is fast running out of exploitable surface water. In many catchments the resource is already being over-utilised, to the detriment of health and environment.
2. The National Water Act of 1998 recognised the integrated and indivisible nature of the water resource and the Department of Water Affairs has restructured to take account of this.
3. Our understanding of groundwater and its availability across South Africa is improving, but still has some way to go. The NGS is proposing that figures for groundwater availability from the current Groundwater Resource Assessment (GRA2), i.e. Utilisable Groundwater Exploitation Potential, be formally adopted by DWA and recognised across the sector, in the same way that surface water assessment values are accepted and used. At the same time even regionalised assessments are not precise enough and cannot replace the need for local investigations and assessments at the project scale.

It is also recognised that there needs to be far more investment if we are ever to accurately know how much groundwater is available for planning purposes. The imbalance in investment between groundwater and surface water must be redressed.

How Much Groundwater Do We Have?

The Utilisable Groundwater Exploitation Potential in South Africa is estimated at 10 300 million m³ per year (7 500 million m³ in a drought year), allowing for factors such as physical constraints on extraction, potability, and a maximum allowable drawdown (Middleton and Bailey, 2009). We currently only use about 2 000 million m³ per year of this groundwater. Our total surface water "assured yield" is given as 12 000 million m³ per year in the National Water Resource Strategy of 2004, with almost all of this water already allocated. Surface water yield can be reasonably estimated per quaternary catchment but this is far more difficult for groundwater, and national and regional estimates are only now being broken down to quaternary catchment scale as the focus of a revision of the GRA2 data.

Given that "assured yield" in the National Strategy was provided at a normalised 98% assurance (1:50 year failure), the groundwater resource availability of 7 500 million m³ for drought conditions offers the best comparative figure to use. With present groundwater use now at 2 000 million m³ / annum, this means that there should still be sufficient groundwater to increase this use by 5 500 million m³/ annum. It must be remembered that this groundwater is not evenly distributed, but spread variably, often thinly, over the whole country. This can be an advantage in providing water for small-scale local use but to utilise most or all of the available groundwater, distributing it to centres of demand, will require a large number of boreholes and connecting pipelines. This may not always be economic, and management is a major consideration.

Groundwater: Surface Water Interaction

Is the use of groundwater and surface water fully, or even partly, complementary? This is a perennial question that is addressed in the NGS. Some surface water sources are fed by groundwater (springs, groundwater "eyes", some baseflows) and all groundwater is recharged from the surface. The question of groundwater: surface water interaction requires a dedicated newsletter, but briefly the strategic approach is that the total resource is far greater than either of the individual sources, although not always strictly additive. Drawing more groundwater may sometimes impact surface water availability - but total availability, and efficiency, will improve. It is the total resource that must be understood, planned for, and managed. Estimates of groundwater availability have taken possible impacts on surface water into account, and the volumes suggested above should be seen as additional available water. Abstractions do need to be considered on a case-by-case basis.

Planning For Groundwater

The NGS states clearly that Groundwater Resource Assessment (GRA) data and information needs to be more accessible. Groundwater data will also be a lot more useful when reasonably accurate estimates have been made at the scale of quaternary catchments. An important part of the strategy is to see that this is achieved, and that the data is accepted and used for planning purposes. Existing planning instruments, and the evolving approach towards the integration of groundwater, are discussed briefly below.

The National Water Resources Strategy (NWRS)

South Africa's key strategic water resources document, the first edition of the NWRS in 2004, made a valiant effort to raise the profile of groundwater and to partner it with surface water in line with the intent of the National Water Act of 1998. The intent of the new National Groundwater Strategy is to provide content and direction for the revision of the NWRS, due this year, 2010.

Water Services Planning

Water Services Planning (nationally and by Water Services Authorities) has very largely tried to provide for the huge demands of the Millennium Development Goals by "riding on the back" of existing water resource infrastructure. This has historically been surface water dominated. It has also been driven at national and local level by a cadre of technicians and engineers focused on infrastructure and delivery, and not on seeking new water sources to meet that delivery. Local Authorities, and even user communities, often have a strong surface water bias. The attraction to Water Services Authorities of large-scale bulk infrastructure

schemes based on surface water and long-distance transfers has retarded groundwater development. It is an important thrust of the NGS to reverse these positions.

DWA's Internal Strategic Perspectives (ISPs)

The Planning Directorates within DWA (Water Resources and Water Services) are calling more strongly for the development and use of groundwater. DWA's Internal Strategic Perspectives (ISPs, 2005), which added detail to the National Water Resource Strategy at Water Management Area level, were an important turning point. These ISPs put groundwater seriously into the integrated water resource planning arena, and in many catchments suggested that this was the only major resource left for future development. The ISPs are the forerunners for Catchment Management Strategies, and these planning documents provide the contextual framework for all further water resource planning.

Reconciliation studies for the major metropolitan regions

The ISPs have been followed by detailed water resource planning studies for all of the major metropolitan centres around the country. The requirement at this scale of demand is not as easily met by groundwater, and surface water solutions still predominate. Nevertheless, very significant planning budget has been devoted to the Table Mountain Group Aquifer as a source for Cape Town. For Port Elizabeth the Nelson Mandela Bay Municipality (NMBM) has a number of boreholes in the Uitenhage aquifer that have been neglected and gone unused. (Uitenhage itself has for many years been drawing 5 million m³/ year from the Uitenhage Springs). With current drought and supply problems the NMBM, with support from DWA, is investigating which of these boreholes can be refurbished and put into production. In addition to the Uitenhage aquifer there are four other possible wellfield developments in the vicinity of Port Elizabeth, each with an anticipated yield of 1 million m³, which could supplement supply to the city.

Reconciliation studies for all South African towns and villages

As we downscale from the level of the metros, the utilisation of groundwater becomes ever more practical and important. The Water Resource Planning Directorate of DWA has launched a "Water Resource Reconciliation Study" for all of the towns across South Africa. In most of the towns where there is a current or predicted water shortage, groundwater is promoted as a primary source in preference to the use of new surface water sources. (Implementing Water Conservation and Water Demand Management measures, and the reuse of water, are other key strategies being promoted where applicable). This is a new emphasis on groundwater and does not always accord well with Local Municipalities, Water Services Authorities, and vested interests in water supply. One example of a changing attitude, however, is that Chris Hani DM will be developing local groundwater for supply augmentation to the Eastern Cape towns of Hofmeyr and Middelburg - this after years of arguing for surface water to be piped from the Orange River scheme at Teebus.

Planning studies show that sufficient water can almost always be sourced from groundwater, even though this may need treatment to improve its quality. Utilising groundwater may take additional management effort and skill. There is going to be a call on geohydrologists, water resource managers with groundwater expertise, and technicians to manage equipment and monitor both quantity and quality, in order to bring about a better served and better serviced groundwater sector.

IDPs and WSDPs

There is a strong link between the "All Towns Studies" and Water Services Development Plans (WSDPs) - which are required to define the infrastructure for both water supplies and sanitation systems. Too often the source of water, and its availability, is not given enough consideration. The WSDPs, and the IDPs into which they fit, need to have water resource availability as a standard consideration - with groundwater given similar planning emphasis to that accorded in the All Towns Studies. This would be within the water resource framework set by the NWRS, the ISPs, and Catchment Management Strategies.

The use of groundwater must also be considered outside the realm of urban and domestic needs. Agriculture remains by far the greatest single-sector user of water and also of groundwater. The cascade of planning tools in the hands of authorities would be the Department of Water Affairs' own "Water for Growth and Development Framework", followed by Provincial Growth and Development Strategies, and the IDPs. Key sectors with specific planning needs would be Agriculture and Mining.

Water for Growth and Development

An important step in changing attitudes is the emphasis on the role and importance of groundwater found in DWA's draft Water for Growth and Development Framework. The WfGDF carries the message that further development is very largely dependent on the better utilisation of groundwater sources. This is part of a groundswell of understanding and awareness raising.

Provincial Growth and Development Strategies

It is not yet clear how Provincial Growth and Development Strategies are going to pick up on the matter of water resources. The first step is to ensure that they do so at all, and that groundwater is recognised and understood as an asset. These strategies are able to take a relatively broad view and can form a useful bridge between national strategy and real implementation at LM level.

Sectoral Planning - Agriculture

The role and value of groundwater has long been understood in the agricultural sector. It is also here that some of the worst abuses of the resource have been experienced, with collective over-exploitation by individual users. The concept of sustainability is not an easy one to instil in the collective, and is proving to be one of the big challenges to the regulator.

Sectoral Planning - Mining

The mining sector is potentially one of the biggest beneficiaries of planned use of groundwater, and the issue here is to turn the perception of groundwater as a liability into that of asset. Water needs to be planned for in terms of supply for operations, the flooding of mine workings with groundwater and the need to pump these dry, and most critically the pollution of this water when it comes into contact with exposed ore bodies, giving rise to acid mine drainage. With the licensing of water use to support further mining operations one of the major constraints to the development of the sector it is necessary to develop innovative approaches to the pre-emptive exploitation and use of the very water that creates so many problems.

Planning For Quality

The threats to groundwater quality are multiple and are addressed under the specific theme of “Groundwater Quality Management in the NGS”. The biggest issue is surely that of acid mine drainage (AMD), where polluted groundwater is itself unusable without expensive treatment, and ultimately decants to contaminate surface water sources. Here the first prize is to prevent pollution and AMD by intercepting and utilising groundwater before it enters the mine workings at all - thus drawing on a natural local resource, using as much as is required, and keeping this water from unnecessary contamination. In undisturbed situations many users, even towns, are able to use groundwater directly without treatment, whereas in almost all cases surface water has to go through at least a primary level of purification. There are also situations where it may be more economic to treat and use even severely polluted groundwater than to try and source this water from distant surface sources.

Another issue is saline intrusion into coastal aquifers (with the Sandveld on the West Coast and towns in the Algoa district as examples) caused through over-exploitation and a negative flow gradient. Critical, too, is the pollution of local resources through either inadequate or badly located sanitation. With groundwater promoted as a local, and often most economical resource for thousands of towns and villages around the country it is critical that developments should not contaminate those very resources upon which they depend.

Monitoring And Planning

The link between planning and knowledge of the resource - i.e. just how much water can be used sustainably - has already been made with regard to resource assessment. This link is as important when it comes to management. Monitoring both the quantity and quality of groundwater in the operations phase is the key to sustainable use. The lack of a “monitoring culture” within the groundwater sector is addressed in the NGS under the “Information Management” theme and will be the subject of our next newsletter.

Your feedback

Your inputs on this topic, or any other aspect related to the future of Groundwater in South Africa, would be much appreciated. Please direct correspondence to Dirk Versfeld at dirki@iafrica.com or Fanus Fourie (DWA NGS Project Manager) at fourief@dwa.gov.za.

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