



Department of Water Affairs and Forestry  
REPUBLIC OF SOUTH AFRICA

## **A FRAMEWORK FOR A NATIONAL GROUNDWATER STRATEGY**





DEPARTMENT OF WATER AFFAIRS AND FORESTRY

REPUBLIC OF SOUTH AFRICA

# **A FRAMEWORK FOR A NATIONAL GROUNDWATER STRATEGY (NGS)**

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**In collaboration with WATER GEOSCIENCE CONSULTING**

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## **PREFACE**

This framework document is in response to the need for a broadly based national process to put in place a National Groundwater Strategy (NGS). It provides direction and support for the formal process that will allow for the development and implementation of a collective national strategy on groundwater. A comprehensive NGS should provide a clear purpose and positioning for the future and inform the National Water Resources Strategy (NWRS) and achieve better integration.

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## **1 INTRODUCTION**

### **1.1 Background**

The Department of Water Affairs and Forestry (referred to as the Department, or DWAF) has supported the development of this framework, with the intention of providing the base upon which a National Groundwater Strategy (NGS) can be built.

The National Water Policy (DWAF, 1997) has as a core principle that all water, wherever it occurs in the water cycle, should have equal status in law. Groundwater is discussed extensively in the national policy, especially:

- ❑ Its special nature
- ❑ The need for special management measures
- ❑ The need to integrate the management of surface water and groundwater.

The National Water Act (NWA, Act 36 of 1998) and the National Water Resource Strategy (NWRS, DWAF 2004), which have grown out of the National Water Policy of 1997, provide for groundwater as part of an integrated water resource. The fundamental principles and objectives of South Africa's water law with implications for groundwater, are that:

- ❑ All water is a resource common to all, and is subject to national control
- ❑ All water has a consistent status in law, irrespective of where (and where in the water cycle) it occurs
- ❑ Groundwater is an integral part of the water system and must be managed as such.

Groundwater can therefore no longer be viewed as a privately held resource. The NWA, at the same time, introduces and embraces integrated water resource management (IWRM). For those involved in the management of groundwater this has meant not only dealing with a major shift from private to public water, and the concomitant management implications, but also with all the implications of integration with the hitherto dominant surface water component.

Despite the policy drivers, South Africa has some difficulty in moving towards integrated water resource management. Groundwater is a long-neglected element of the resource and its elevation to the status of partner with surface water requires firm action if it is to be meaningful. The NWRS needs to be able to reference a comprehensive National Groundwater Strategy (NGS) and should contain the major features of that strategy. The NGS cannot be reactive; it needs to empower groundwater stakeholders, and to provide for the regulation of the sector.

This framework outlines the higher level strategic needs for the groundwater sector as a whole in order to shape a National Groundwater Strategy, which, in turn, can better inform the NWRS.

## **1.2 A recent history of groundwater strategy development**

The recent development of a groundwater strategy for South Africa began with the commissioning of a National Groundwater Strategy (NGS) development project in year 2000 by the Department of Water Affairs and Forestry, with the intention of providing inputs to the NWRS. This resulted in a strategy commonly referred to as the DWAF/Danida strategy (DWAF, 2001), with development supported by Danida. The strategy was useful but could not claim to be national in scope or content, nor was it broad-based and participatory in its development. This framework document is therefore aimed at providing the building blocks upon which a truly national strategy, which serves the needs of all groundwater stakeholders, and which integrates with the NWRS, can be constructed.

The need for a more acceptable NGS that is fully representative of the views and ideals of the groundwater sector was confirmed through an internal consultation process conducted by Titus, Nyabeze and Versfeld, (2006). This process involved the following:

- ❑ A situational assessment and articulation of the role and importance of groundwater and concerns relating to its use
- ❑ One-on-one interviews with DWAF stakeholders to obtain the Departmental perspective on the situation regarding groundwater and proposals on the way forward
- ❑ A workshop to obtain views from DWAF stakeholders and find agreement on the way forward
- ❑ A review of literature, and interviews with a range of stakeholders from within and outside DWAF, aimed at identifying the main drivers for the NGS
- ❑ A review of literature to identify key institutions
- ❑ The preparation of reports, strategies and proposals

One outcome of this process was recognition that a broadly based national process to put an NGS in place would be demanding and involved, and that a framework was required to provide direction and support. This framework therefore proposes the adoption of a formal process for the development of the NGS that will allow for the development and implementation of a collective national strategy. This should offer a 'change mechanism' for the groundwater industry, providing a clear purpose and positioning for the future.

## **1.3 Building a national strategy and not a DWAF strategy**

Whilst the Department plays the lead role in the management and regulation of all water, including groundwater, and this framework correctly considers the very specific needs and issues facing the Department, it is important to shape the strategy towards all stakeholders in the country. A national groundwater strategy must guide not only the policy-maker and regulator, but also the many user and service sectors, including the research and information sectors.



With the development of a National Groundwater Strategy being driven by DWAF the thinking has, not surprisingly, tended to be more closely aligned to the immediate needs and thinking of the Department than to the needs of the nation. It is necessary to consciously avoid a bias towards a Departmental Strategy when the requirement is for a National Strategy.

This is a particular challenge in the development of an NGS and will require strong participatory and negotiating skills. The lead agent in this strategy development must, however, remain the Department of Water Affairs and Forestry, as custodian and responsible manager of the resource.

## **2 AIMS AND OBJECTIVES OF A NATIONAL GROUNDWATER STRATEGY**

### **2.1 Aims**

*Aims of the National Groundwater Strategy should be that:*

- ☐ Groundwater as a resource is given its rightful status alongside surface water, helping to meet the growing water demand as a recognised strategic resource within an integrated water resource management approach
- ☐ The knowledge and use of groundwater is increased along with the capacity to ensure sustainable management
- ☐ Pro-active groundwater management programmes are developed and implemented at required water resource management levels, focusing on both quantity and quality aspects

### **2.2 Objectives**

*The objectives of the National Groundwater Strategy should be to:*

- ☐ Assess and describe the broader strategic aspects shaping the groundwater sector, with an emphasis on integrated water resource management
- ☐ Appraise the ability of existing water resource management institutions to coordinate and administer all aspects of groundwater management at all three levels of water resource management
- ☐ Bring about a change in mindset. Attitudes towards groundwater, at all levels, must change fundamentally
- ☐ Bring groundwater within the reach of those who do not have ready access to water – particularly resource poor farmers and the very poor that require sufficient water to achieve a reasonable standard of living
- ☐ Grow investment in groundwater. Ensure that sufficient funds are allocated to the development and use of the groundwater resource at all levels; research, information, development and use
- ☐ Improve knowledge of the resource, reliability of information and access to information. Improve information sharing between groundwater management and water services institutions

- ❑ Ensure that regulation and other measures are in place to protect against over-exploitation and pollution
- ❑ Ensure that programmes are in place to adequately monitor the resource status (quantity and quality)
- ❑ Create an enabling environment - through Strategies, Guidelines, and other communications
- ❑ Ensure a sound institutional platform (especially within DWAF)
- ❑ Build hydrogeological capacity in South Africa

### **3 ASPECTS RELATING TO THE CURRENT MANAGEMENT OF GROUNDWATER**

Interviews with stakeholders have highlighted the following aspects relating to the use and management of groundwater, which need to be given attention in the NGS,

- ❑ **Full integration of the groundwater resource into water resource management has yet to occur.** DWAF staff are concerned that the NWRS does not deal adequately with groundwater. Although the NWA and NWRS make it clear that groundwater is an integral part of the water resource and is covered in all references to “water”, stakeholders are not accustomed to this and there is a need for awareness-raising and training. There is a cascade of issues on groundwater ranging from strategy, to implementation and operational plans, needing more explicit attention.
- ❑ **Poor understanding of the groundwater resource and its relation to surface water.** Some stakeholders still fail to see the linkages between surface water and groundwater, seeing these as quite separate and independent sources. This poses problems for integration.
- ❑ **There are strong negative perceptions about groundwater.** Groundwater is perceived by many to be unreliable despite often being a superior source.



Figure 1: Poor asset management often leads to loss of equipment

- ❑ **Human resource capacity losses are severe.** South Africa is fast losing hydrogeological skills and management capacity, at the time when these are most needed.
- ❑ **Abstraction and use are often not monitored.** At present very little monitoring takes place and the responsibilities of users are not defined, except in the case of new licences. All users should be obliged to monitor, record and report on use. Local, regional and national monitoring programmes are essential if the resource is to be optimally exploited.
- ❑ **Investment in groundwater has been very low.** Surface water use has seen high levels of long-term and sustained investment. This has been in the construction of dams, tunnels and canals as well as in obtaining better understanding of the resource through measurement and monitoring. Despite its importance in terms of both volume and distribution, it is doubtful that groundwater has seen 5% of this investment (DWAF Groundwater Workshop 2006). There are signs that this is changing, but whether this is because of policy shifts

or rather because the limits of surface water are now being realised, is open to question.

- ❑ **Knowledge of groundwater is neither as accurate nor adequate as for surface water.** This is clear from the content of the NWRS. DWAF's Internal Strategic Perspectives (ISPs)<sup>1</sup> place emphasis on groundwater only where surface water is no longer available. There is also a concern that groundwater is not adequately considered and captured in other planning and development processes such as Integrated Development Plans (IDPs) and Water Services Development Plans (WSDPs). Concerted effort is required to change this situation.
- ❑ **The research needs for groundwater are not loudly expressed.** Typically there is the need for improved understanding of the groundwater : surface water interaction. How can the overall use of the resource be optimised? How can the mining industry turn groundwater into an asset rather than the liability it is currently perceived to be? What are the technologies so that groundwater can be accessed to meet the needs of the rural poor on an extensive basis?
- ❑ **Managing the decant of polluted mine water.** The filling and flooding of both working but especially abandoned mines results in the decanting of highly polluted water into sensitive ecosystems.



Figure 2: Water from mines can be a source of pollution

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<sup>1</sup> Internal Strategic Perspectives – developed for each WMA as the Department's forerunners to Catchment Management Strategies



- ❑ **Groundwater is also susceptible to pollution.** Although not as susceptible as surface water, pollution of the groundwater resource from the very towns and villages dependent upon it is a constant threat, particularly as urban migration outstrips service development.

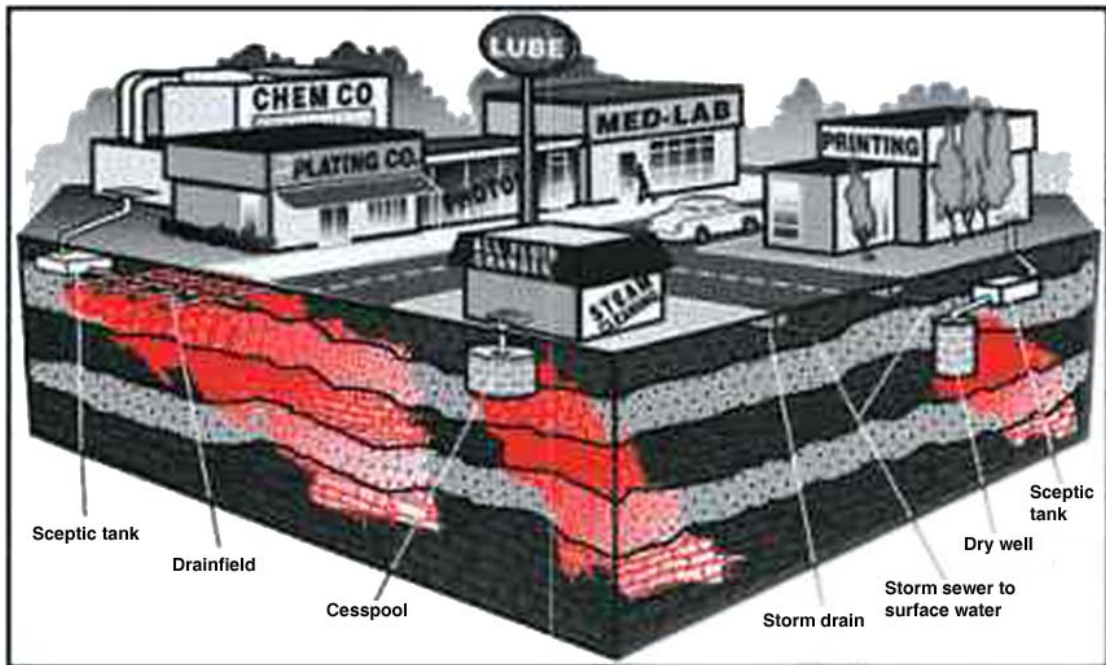


Figure 3: Illustration of how groundwater can be exposed to pollution

- ❑ **Over-abstraction can result in irreversible damage to aquifers.** There is very little monitoring and a growing demand. All aquifers, including major aquifers used in irrigation, are at risk of failure unless properly managed. This does not just mean the inconvenience of running out of water for a while but can often mean permanent damage to, or total failure of, the resource. Examples are salt-water intrusion along the coast, and the permanent failure of supply to over-abstacted boreholes in fractured rock systems. This is not through any fault of the resource, but through excessive demand as users draw upon the water from 'dams they cannot see' and which they do not monitor. This is a management problem. These threats to sustainability demand urgent and immediate action, as is taken when surface water resources reach critical levels.
- ❑ **Inefficiencies can arise from under-utilisation.**
- ❑ **Poor development can result in unreliable supply.**



Figure 4: Destruction of borehole infrastructure affects reliability of supply

- ❑ **Unbalanced publicity between successes and failures.** Whilst failures in supply, especially where these impact on health, dominate in the media, the use of groundwater in South Africa is in reality a long-running success story. Groundwater provides entirely for towns, villages and thousands of hectares of irrigated farmland. There is need to identify, document and publicise successes.



Figure 5: Poor protection results in diseases such as cholera

#### **4 RAISING THE PROFILE OF GROUNDWATER**

The groundwater strategy must communicate the importance, status and legal standing of groundwater, raising its profile and changing mindsets. This includes the development of materials on approaches and anticipated outcomes as part of a “communication strategy”. The communication strategy will need to actively address the negative perceptions that are often associated with groundwater.

The implementation of the communication strategy must include the documentation and sharing of success stories. It is important to identify the different target groups, channels to be used, and the set of messages to be communicated.

Some of the key messages that should be captured in this communication strategy include the following:

- ❑ **A large amount of groundwater remains untapped.** Further development of groundwater can contribute significantly to the country meeting its Millennium Development Goals especially in water supply and sanitation. The volumetric contribution of groundwater is about 10% of South Africa’s total water use and there is definite scope to increase use.



- ❑ **Conjunctive use of surface and groundwater adds to overall water security<sup>2</sup>.** Groundwater offers greater security of access to water in a country fast running out of cost-effective surface water options. Planning and resourcing for groundwater use needs to be undertaken during times of adequate supply, and not only in times of crisis. Groundwater resource development must be adopted as a long-term planning, management and supply tool, and not only as a drought relief tool. The objective is to secure sustainable use of the total water resource – and not just to ameliorate critical situations.
- ❑ **Groundwater can be more convenient and less expensive than surface water.** The highly distributed nature of demands on rural water means that many regional surface water schemes are not economically feasible, leaving only groundwater, which is often more readily available and cheaper to supply than surface water. Access however depends on technology, skill and good borehole site identification. Sustainability depends on moderation in use, monitoring and protection.
- ❑ **Groundwater is a feasible water supply option for many communities:** Reasons include:
  - Its distributed nature, and relatively low cost in some situations
  - The groundwater supply can be more reliable than surface water during dry seasons and drought periods – when rivers and springs may dry up.
  - The high incidence of surface water pollution in both rural and urban areas, when groundwater is often clean.
- ❑ **Groundwater is generally safe, clean and reliable.** This depends on management, protection and monitoring. In the case of surface water, dam levels are constantly monitored, made public, and restrictions are introduced when required. So too, the supply, replenishment and use of groundwater should be reviewed, although timeframes may be much longer than for surface water storage.

The development and implementation of the communication strategy will feed into the NGS and proceed in such a way that it will become an integral component of the strategy.

## 5 ACTIVITIES IN THE DEVELOPMENT AND CONTENT OF THE NGS

Activities in the development and content of the NGS will involve the following:

- ❑ The participation of stakeholders from all groundwater sectors

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<sup>2</sup> Conjunctive use is the combined use of surface and groundwater. Groundwater should be brought into use even when surface water is available. Proper adoption of conjunctive use suggests a value equalisation of storage above and below ground, where below-ground storage is accorded the same standing as surface water storage.



- ☐ Visioning
- ☐ Supporting the implementation of IWRM - ensuring the visibility and status of groundwater
- ☐ Changing mindsets
- ☐ Documenting success in the use of groundwater
- ☐ Understanding groundwater: surface water interaction
- ☐ Bringing investment and resources into the groundwater sector
- ☐ Building up resource information: improving knowledge on availability and use
- ☐ Promoting resource protection: management of the resource with a focus on both quantity and quality.
- ☐ Monitoring both the resource and impacts of management
- ☐ Information sharing
- ☐ Strategies and guidelines to create an enabling environment
- ☐ Building capacity in hydrogeology
- ☐ Strengthening leadership of the groundwater sector

A brief outline of each process is provided in this section.

### **5.1 Process to facilitate participation of stakeholders**

A participatory and sharing approach is required in developing the NGS, communicating with people from the whole groundwater community who have practical, relevant and innovative ideas. The process of consultations is recognised as being complex and time-consuming. This will be informed, at least in part, by the communication strategy.

Much of the groundwater expertise in South Africa now lies outside Government. Whilst the regulatory aspects can be expected to be guided strongly from within DWAF, knowledge of the resource, ability to tap into that resource, and the skills which are necessary in understanding groundwater: surface water interactions, and thus allow for an optimisation in the conjunctive use of the water resource, are to be found in the private sector. Not to be forgotten, too, are communities and supporting NGOs.

Participation starts with the identification of interested and affected parties (see also Titus et al, 2006). Included are water resources and water services institutions at national, provincial and local government levels. Categorising stakeholders shows that there are those who seek to develop, protect and manage the resource, and others who are intent on maximising use. Stakeholders include:

- ☐ **The Department of Water Affairs and Forestry**, with development, management and regulatory functions. The Department has national and regional water resource structures but has lost a significant proportion of its geohydrological capacity.

- ❑ **Local Government.** A user of water but also now a water supply authority. Many local government institutions struggle with capacity and consequently also with standards.
- ❑ **Bulk water service providers** (e.g. Water Boards). These often neglect groundwater options in favour of surface water schemes.
- ❑ **The mining sector.** The groundwater industry is driven predominantly by mining (70%) yet this sector is largely reactive in its interest in groundwater. The mining sector tends to see groundwater as a liability that floods mining works and becomes polluted, rather than as an asset. The sector uses significant volumes and prefers to use surface water as its key source even though this water could often be accessed from groundwater sources. This is a critical sector to engage in strategy development.
- ❑ **Mitigation-driven consultants.** Primarily driven by the mining sector and its immediate needs. Concerns lie in exploitation, mitigation and management, and these consultants are not driven by wider resource use and optimisation needs. Focus areas include: Environmental Impact Assessments, dewatering, pollution (decant quality), and waste site management. These roleplayers are technically very skilled when it comes to drilling, pump testing etc. They are highly practical. However the work of these consultants is largely reactive and in response to groundwater as a problem, thus failing to communicate the value of groundwater as a sustainable resource.



Figure 6: Testing boreholes

- ❑ **Supply-driven consultants.** These consultants have a particular interest in the source of supply (quantity and protection aspects) – and in elevating the use and status of groundwater as a resource of national importance.
- ❑ **The drillers.** Although drilling is demand-driven the drillers are the first-level developers of the resource. For this reason drillers can also be used a major locus of control, and can be drawn upon as a key source of information on the resource. Strategies to manage the activities of drillers, and to ensure that drillers submit returns on their activities (borehole sites, depth, success/ failure, delivery rates and quality, strata encountered, etc) would provide an otherwise unachievable source of information.
- ❑ **Communities and NGOs.** These are generally small-scale users with demand often limited to basic human needs and livelihood requirements. NGOs are seen as an important way of ensuring advice and technical service delivery at community level. This suggests the need for technologies to provide small volumes of water to large numbers of people, for example through groundwater well points where the water table is within relatively easy reach of potential users.



Figure 7: Drilling boreholes

The point of departure is to map out concerns held by stakeholders. Interactions should also (i) capture the “natural” roles and responsibilities of different stakeholders with respect to groundwater management (ii) capture

local knowledge of the resource and its utilisation, and (iii) mobilise further understanding both with regard to quantity and quality interactions.

For an efficient and effective programme of ideas and information gathering, it should be expected that consultants devoting their time to inform the NGS would need to be compensated.

## **5.2 Visioning**

Visioning is an important early step aimed at describing a desired future state. This is a negotiated process, with the vision built upon widely ranging knowledge of the current situation, experience, and recognition of trends. The vision should be applicable at all levels of water resource management and use, and it can be expected that some compromise will be necessary in finding commonality. The vision is in itself not a strategy but should enable strategy development.

The vision for groundwater needs to express its importance as a resource, and the role that it can play in meeting South Africa's development demands. Central in this vision is the position which groundwater now holds as an integral and indivisible component of the water resource, and the way this is upheld in integrated water resource management.

The Guidelines for Catchment Management Strategies (DWAF, 2007) provide a useful basis for the development of a vision, also applicable to groundwater.

## **5.3 Supporting implementation of IWRM – ensuring the visibility and status of groundwater**

Surface water and groundwater are part of a single resource – and should never be separated. In considering the utilisation of water, both surface and groundwater must be accorded equal status.

The visibility of groundwater must be improved by effectively communicating and promoting existing information and products on groundwater use and development within and outside of DWAF. A central and major emphasis needs to be placed on groundwater as a crucial national resource that has long been neglected. For this to enter the national consciousness the role of groundwater must be understood and adopted by DWAF's top management. The recognition of the importance of groundwater must be passed back down into the Regions through internal policy, public statements, the establishment of supportive national structures, staffing, and groundwater-specific investment in the Regions/CMA's.

## **5.4 Changing mindsets**

Although many people believe in groundwater, others question the reliability of the resource, and yet others profoundly dislike it. There is a lack of understanding that needs to be corrected.

Groundwater in South Africa has, until recently, not been viewed as being a major resource with the potential to compete with surface water as a supply



source. The secondary role it has been allocated has resulted in groundwater being seen as a secondary resource of lesser importance. However the impact of groundwater far exceeds its volumetric contribution and a major strength is its ability to serve widespread rural populations and farms in situations where there is little or no other water available.

Groundwater can be a major supply source in South Africa. The essence is in changing people's minds. The NGS must aim to shift the balance so that there is less reliance and concern with regard to surface water, and a greater investment in and reliance on groundwater. The NGS should serve as a tool in achieving this. The information, principles and approaches contained in the ISPs provide a useful start.

### **5.5 Documenting success in the use of groundwater**

Part of the programme to change mindsets is to demonstrate just how effective (reliable and cost effective) groundwater can be as a source of supply. The approach is to document the country's current reliance on groundwater and the comparative benefits which have been achieved in some specific cases (quality and cost).



Figure 8: Successful use of groundwater

### **5.6 Understanding the groundwater: surface water interaction**

The concern with groundwater abstraction has been that this may affect surface water yield, when the emphasis should rather be on how to optimise total yield. There are situations where the harvesting of groundwater may well improve efficiencies, with total yield being higher even if there is an impact

on surface water. Because most investment has been into surface water, this source has always been given priority, with any impact of groundwater use seen as being negative. Changing the perception of groundwater as a secondary resource, and allowing that groundwater has as much justification to be used as surface water, can create more yield, but the impacts of groundwater use on surface resources do need to be understood. Central to this is that groundwater storage is generally far more efficient than surface water storage.



Figure 9: High yielding borehole

### **5.7 Bringing in investment and resources**

The aims and objectives of the NGS can only be achieved if the requisite investment and resources are available to the groundwater sector. It is also an important part of changing the mindset, and the money that is put on the table will reflect the level of acceptance of groundwater. If the requisite funds are made available then work gets done and progress is made. This includes resources for capacity building within DWAF. The NGS should provide for the financial framework to guarantee its implementation.

### **5.8 Building up resource information – improving knowledge on availability and use**

Attention must be given to resource availability and potential for development. The NGS should focus on individual areas and systems rather than concentrating on numbers for the country as a whole. Resource availability and use should be dealt with on a site-specific basis, at well-field or aquifer scale.

The groundwater volumes (availability and use) quoted in the NWRS were conservatively based on best available knowledge at that time. Actual resources are today thought to be considerably greater. This has been borne out in part by GRA II (Groundwater Resource Assessment II) but there is a strong school of thought that even these estimates do not come near the actual potential. GRA II provides a national estimate and remains theoretical. The requirement is for a further assessment (GRA III), which will verify potentials, providing practical estimates at a regional to local scale.

Local and regional management requires that we get back to the basics of local water availability and use. GRIP, the Groundwater Resources Information Project instituted by DWAF's Limpopo Region captures data for all municipal boreholes (i.e. existing information). GRIP provides a critical technical building block of information. Implementation requires investment, estimated at approximately R8 million / province/annum<sup>3</sup>.

## **5.9 Resource protection - a focus on quantity, quality and resource management**

The NGS should ensure that any strategy that deals with groundwater should place sufficient emphasis not only upon sustainable abstraction and use (quantity) but also upon resource quality protection. Protection refers to both the quantity and quality of the resource.

### *5.9.1 Resource quantity protection: sustainable abstraction*

Critical to the use of all water is that use should be sustainable. This is easier to see and control in the case of surface water where levels and shortages may be more readily observed. An absolutely fundamental strategy – which must be given great emphasis in the NGS – is that groundwater resources should in all circumstances be monitored, and that there should be a protection plan against over-utilisation that is strenuously applied. The consequences of over-utilisation of groundwater are generally far more serious than for surface water and can lead to permanent loss or damage to the resource.

### *5.9.2 Resource quality protection*

If groundwater is to achieve the potential it is accorded by GRA II, it has to be protected. The groundwater resource is under real threat (saltwater intrusion, over-utilisation and permanent failure of boreholes and aquifers, pollution from mines and people). DWAF's Directorate Resource Directed Measures is responsible for environmental resource protection policies. Groundwater is absolutely integral to this - hence RDM's strong interest in 'Protection Zoning'. The overall groundwater strategy needs to be shaped so that the 'protection element' can fit in comfortably.

### *5.9.3 Focus on managing the resource*

The NGS should bring a focus to the management of existing supplies. Too strong a focus on groundwater development for the provision of new supplies creates the impression amongst users that "we have inexhaustible source of

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<sup>3</sup> Eastern Cape, KZN, and Free State have all initiated similar GRIP-style projects

water and will always come up with another plan". A National Groundwater Strategy should not be a strategy that leads to further profligacy of use of water, which is a scarce resource even though there may be more groundwater available, but should create a strong ethos regarding the management aspects of the resource.

#### **5.10 Monitoring the resource and impacts of management**

The NGS should facilitate the development of strategies and guidelines for the monitoring of groundwater. These are fundamental to sustainable use of the resource. The NGS needs to put measures in place to ensure that implementation takes place and that it is effective.

#### **5.11 Information sharing**

The NGS should direct people towards ongoing and useful initiatives in groundwater resources management and information. These include:

- The National Groundwater Archive (NGA)
- The National Groundwater Database (NGDB – to be replaced by the NGA)
- The South African Groundwater Decision Tool (SAGDT)
- The Groundwater Dictionary
- Groundwater Resource Assessment II, and GRA III
- Research into Groundwater Dependent Ecosystems (CSIR)
- Research on water availability and use in the dolomites
- Success stories on groundwater development and management

Information sharing should also be a key element in the communication strategy.

#### **5.12 Strategies and guidelines to create an enabling environment**

**Strategies** are required in order to provide direction to management, to provide users with an understanding of the thinking that drives behaviour, and to provide an opportunity to challenge such thinking. A very broad outline reflecting some of the strategic thinking in the Department of Water Affairs and Forestry, with regard to specific management actions, is set out in the document "Strategies in Outline" developed as a background document in the framework process (Versfeld, 2006)

These strategies include, *inter alia*:

- o Promoting the profile and use of groundwater (including conjunctive use)
- o Assessment of potential and opportunity (resource evaluation)
- o Artificial recharge
- o Groundwater use
- o Groundwater protection
- o Dolomitic water use
- o Registration of drillers



- o Information and knowledge sharing
- o Development of capacity in individuals and institutions
- o Using groundwater in support of communities and equity
- o Technology and research
- o Supporting Local Government
- o Support to Water Services
- o Monitoring and compliance
- o Using groundwater in drought and risk management

**Guidelines** will have to be developed to support the groundwater management and related functions of both water resource management and water services institutions at regional and local levels. Guidelines are needed for, inter alia:

- o The licensing of groundwater abstraction and use
- o Integrated groundwater management at Water Management Area (WMA) level
- o The shared management of local groundwater resources from a water user perspective
- o Groundwater monitoring and information management at WMA level and between WMAs
- o The setting up of Groundwater WUAs
- o The management of trans-boundary aquifers.

### **5.13 Building capacity in hydrogeology**

The lack of adequate hydrogeological capacity in DWAF (both Head Office and Regions) negatively impacts on all groundwater management functions as well as on the efficiency of water resource management institutions. The required hydrogeological capacity must be defined with reference to the groundwater management and related functions as set out in relevant legislative and policy documents (to be identified through a functional analysis). A comparison with current capabilities will then indicate whether planning is feasible, along with the need for staffing. While it is recognised that there is limited expertise in groundwater in South Africa, measures must be implemented to attract and retain the required capacity (both in terms of experience and skills) within national and regional institutions. The NGS should facilitate national capacity building and training in groundwater, and encourage better integration of groundwater training with other programmes.

*Capacity building for research* is also important if there is to be an adequate knowledge base within the country.

The introduction of IWRM to South Africa, with the concomitant need for integration skills, has led to an unfortunate weakening in specialist skills – notably in the groundwater field. In the country (and in DWAF) there is a need to retain a groundwater force – and to achieve this requires a degree of independence from Surface Water. At the same time it is important not to

reject the IWRM environment. Successful integration, without the risk of groundwater being subsumed, assumes sufficient hydrogeology capacity if groundwater is to maintain its identity and skills within the framework of integration. Integration has, in practice, resulted in capacity and skill becoming diluted rather than strengthened. A core activity is to reverse this trend, by building skills and allowing for specialisation.

The NGS should seek to take advantage of capacity building programmes such as the Framework Programme for Research, Education and Training in the Water sector (FETWater), the Water Research Fund for Southern Africa (WARFSA) and WaterNet.

#### **5.14 Strengthening leadership in the groundwater sector**

In order for DWAF to fulfil its leadership role in the groundwater sector it is important to re-establish an institutional platform for groundwater (within DWAF) without breaking down the restructuring that has occurred within the national Department, and the benefits that this restructuring has introduced. The NGS should seek to strengthen water resource management institutions, and especially the national Department, with respect to hydrogeology capacity. An analysis of the specific groundwater management functions at national, regional and local water resource management levels as defined within relevant legislation, policies and guideline documents, i.e. a functional analysis, is required. In order to provide cross-functional hydrogeology leadership and support the following two proposals have already been tabled<sup>4</sup>:

- (i) **Appointment of a groundwater champion:** A groundwater champion, at senior manager level within DWAF, with a coordinating function serving as a 'one-stop shop / clearing house' to manage and synchronize operational support especially to DWAF Regions, the CMAs, and local government. A functional analysis will define the functions of the groundwater champion, including the provision of guidance on the development of hydrogeology capacity, and to create awareness of and promote groundwater activities in DWAF.
- (ii) **Establishment of a Reference Group:** A group of specialists that (a) sets objectives, and (b) provides guidance on policies and strategies for groundwater management within water resource management institutions.

DWAF will still need to enlist the support of surface water resource planners in the exploration, management and use of groundwater, and the strategy should make this clear.

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<sup>4</sup> Suggestions made at the DWAF Groundwater Workshop held in February 2006. The resurrection of the Directorate Hydrogeology was not seen as an option.

## **6 ACTION PLAN FOR THE DEVELOPMENT OF AN NGS**

### **6.1 Responsibility**

The development of a National Groundwater Strategy is the responsibility of the Department of Water Affairs and Forestry and core funding will have to be provided by the Department. Implementation will take significant resources and the NGS should describe funding opportunities and approaches.

### **6.2 Timeframe**

The NGS should not take more than three years to develop, starting no later than April 2007.

Implementation planning for the NGS should be targeted at achieving aims and objectives in a measurable way within five years of acceptance of the strategy.

### **6.3 Action steps**

1. The Department of Water Affairs and Forestry to commit to the development of an inclusive National Groundwater Strategy and to budget for this process. Structures within DWAF must be given specific attention to ensure leadership and capacity in groundwater within the context of IWRM.
2. Select and build a NGS development team comprising hydrogeologists, IWRM managers, and policy and strategy development experts. Team composition should provide for the specific inclusion of participatory and negotiation skills. Endorsement that this team is indeed able to represent and reflect their interests should be sought from the 'groundwater community'. This team should not be constrained in its membership but should be in a position to draw in expertise as required, and as advised by the Project Reference Group.
3. Appointment of a Steering Committee or Project Reference Group to provide guidance and advice. It is suggested that this group meet on inception of the project, on completion of the project inception report, and every six months thereafter. Funding will be needed for the regular functioning of this group. Financial and technical project management should be provided separately by DWAF through a project manager.
4. The Project Team should provide a detailed Inception Report within three months of commencement.

*Specific activities envisaged in the development of the NGS include:*

- a) A review of all materials compiled in the preparation of the 2001 DWAF/Danida NGS (DWAF 2001), and in the preparation of this framework document (Titus 2006, Titus et al 2006, Versfeld 2006, Versfeld et al 2006)
- b) The design of a process to facilitate the participation of stakeholders - both users and managers at all levels

- c) Define roles and responsibilities within DWAF
- d) Joint visioning workshops
- e) Technical workshops on the role of groundwater, its availability, and management
- f) Close cooperation with the IWRM process and the development of Catchment Management Strategies in all WMAs
- g) Provision of a legislative and regulatory framework that defines the situation from the point of view of regulator and user
- h) Development of a financial framework to secure implementation of the NGS. This to include an approach promoting investment into the groundwater sector
- i) Understanding the resource. Assessment of availability, potential, use, impact and sustainability
- j) Resource protection and monitoring. The development of a monitoring framework aimed at optimising utilisation whilst protecting the resource. Responsibilities, funding and other resources to guarantee sufficient and sustainable implementation must be described
- k) The development of a range of sub-strategies and guidelines to provide practical support and direction to the groundwater sector. Build upon materials already to hand, including those developed as background to this framework
- l) Consideration of training requirements and facilities for operational staff managing groundwater
- m) The development and implementation of a communication strategy for the sharing of information with stakeholders. Actions within this strategy to be aimed at changing mindsets, and to include:
  - Approaches, strategies and guidelines
  - Documentation of success stories
  - Documentation of outcomes of on-going initiatives
  - Development of information packages and presentation materials

Such actions are not to wait for the completion of the NGS, but should be initiated and ongoing throughout its development

- n) It is evident that the development of the NGS will involve a number of new studies as well as documentation of ongoing initiatives and outcomes. The ISPs have stressed the value of groundwater and provide strategic thinking towards its integration and utilisation. Information and strategies in the ISPs need to be assimilated into the NGS.

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