Integrated Groundwater Quality Management and Protection

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National Water Act, 1998 Preamble

…….

- Ultimate aim to achieve **sustainable use** for the benefit of all users
- **Protection of the quality** of water resources is necessary
- The need for **integrated management** of all aspects of water resources – and where appropriate the **delegation of management functions** to a regional or catchment level so as to **enable everyone to participate**.

Groundwater pre- and post- 1994

Period	Pre - 1994	Post - 1994
Legislation	Water Act, 1956	National Water Act, 1998
Legal classification	'private water'	'significant water resource'
Implication	Not of interest to national government	National trusteeship of a .common resource; All parts of Act apply





Development of DWAF Groundwater Quality Management Policy

1989: DWAF Director: Geohydrology overseas visit

1991: Report of **DWAF – WRC policy development team** to Biennial Groundwater Convention

1992: Water Research Commission (Tony Reynders), USA visit

1994: Overseas Visit: DWAF policy project team (**Geohydrology, Water Quality Management, project consultant**)

1998: a number of WRC projects underway to inform policy formulation (impacts of mining, agriculture and urbanisation)

2000: Policy and Strategy for Groundwater Quality Management in South Africa - **DWAF Water Quality Management Series**

Mission: Groundwater Quality Management

The groundwater quality management mission is set in the context of the water resource mission and is as follows:

'To manage groundwater quality in an integrated and sustainable manner within the context of the National Water Resource Strategy and thereby to provide an adequate level of protection to groundwater resources and secure the supply of water of acceptable quality'.





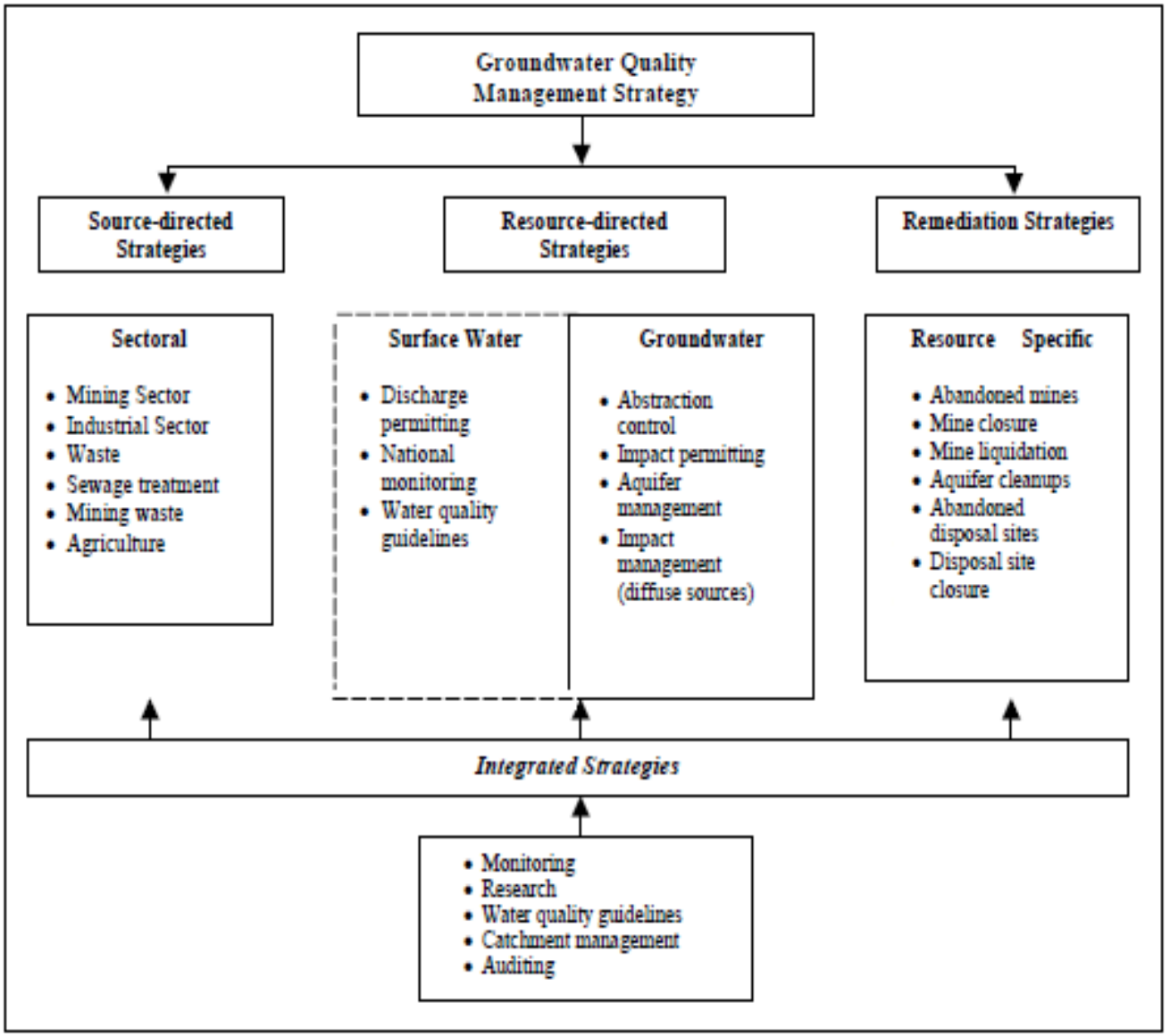
Policy Goals to Achieve Mission

to implement source-directed controls to prevent wherever possible and minimise, at source, the impact of development on groundwater quality by imposing regulatory controls and by providing incentives (mainly Chapter 4 of the National Water Act);

to implement resource-directed measures in order to manage such impacts as do inevitably occur in such a manner to protect the reserve and ensure suitability for beneficial purposes recognised by the National Water Act (1998) (Chapter 3 of the National Water Act);

to remediate groundwater quality where practicable to protect the reserve and ensure at least fitness for the purpose served by the remediation (Chapter 3 of the National Water Act).

Coordination one of most important national functions (Policy, 2000)



Resource-directed Measures (RDM)

The following resource-directed measures are specified by the Act:

- a **national classification system** for water resources, including groundwater;

- **determining a management class** for each resource;

- **determining the "Reserve",** which includes the basic human needs reserve (water for drinking, food preparation and personal hygiene) and the ecological reserve, which must be determined for all or part of any significant water resource such as rivers, streams, wetlands, lakes, estuaries, as well as groundwater;

- **setting resource-quality objectives** which represent the desired level of protection of a water resource.

Precautionary Approach for Groundwater

Groundwater protection will be based on a **precautionary approach** (in recognition of the special nature of groundwater, for which impacts are often long term and irreversible);

All groundwater will therefore be assumed to be vulnerable to damage unless it can be shown otherwise. This approach to protection will be implemented **for source-directed, resource-directed and remedial management measures.**

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Differentiated Protection

In South Africa's situation of widespread and highly localised groundwater occurrence and use, **it will be physically and economically impossible to protect all groundwater resources to the same degree**.

For effective and focused intervention, **a differentiated protection approach** is necessary, **based on the vulnerability – and regional, as well as local importance** - of aquifers.





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Classification for Groundwater Resources

The logical unit for groundwater quality management is an aquifer;

Since aquifers are, in general, contained within a surface water catchment, and since the surface water catchment represents the most logical surface management unit, the Department has adopted the **catchment as the basic groundwater management unit**.

Catchments may, however, be **subdivided into groundwater management areas (aquifers)** for better resolution where appropriate.

Each aquifer will be assigned a management class.





Aquifer classes for differentiated groundwater quality management (DWAF, 2000)

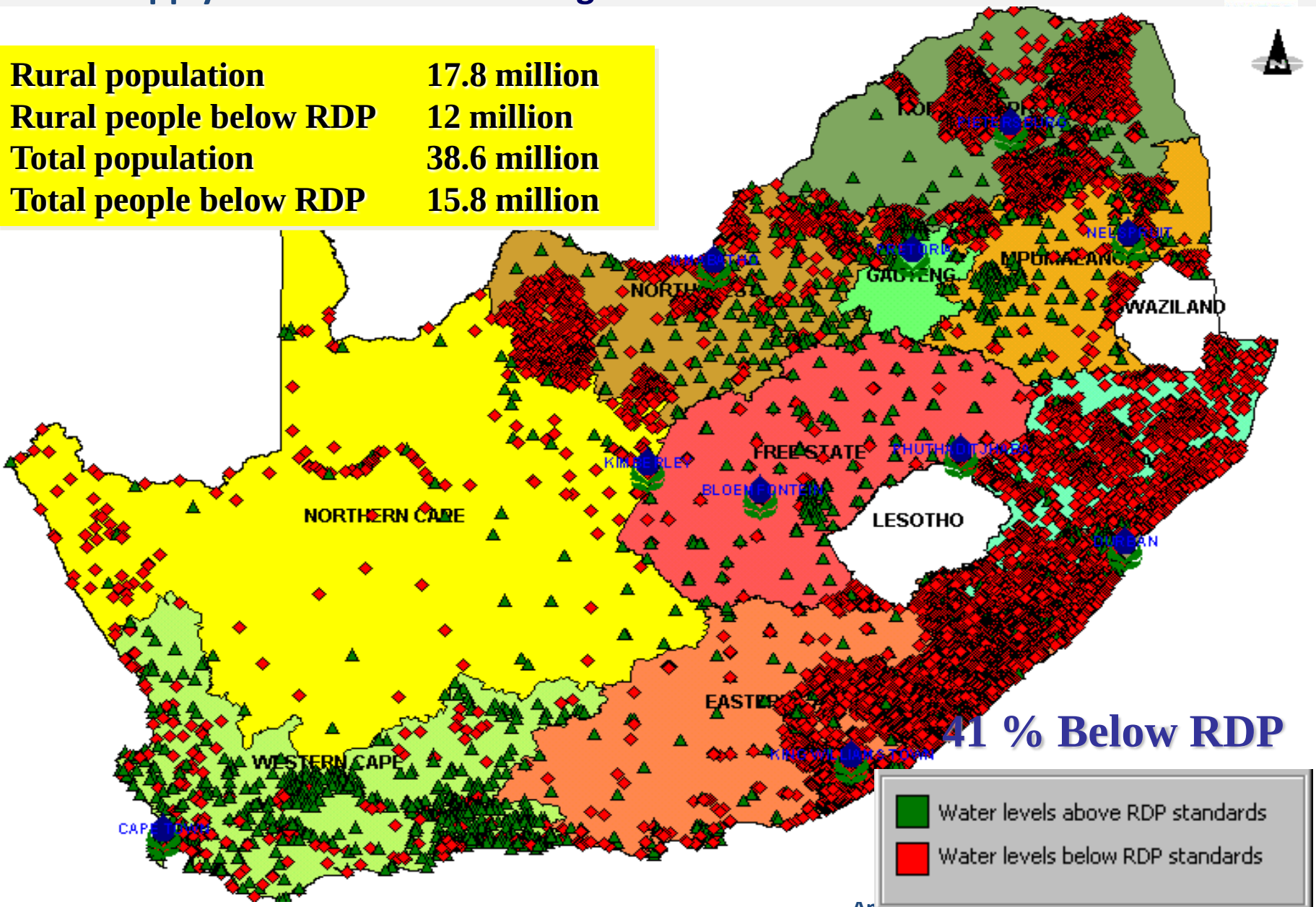
AQUIFER TYPE	DESCRIPTION
Sole-source aquifer	An aquifer used to supply 50% or more of urban domestic water (community water supply) for a given area and for which there are no reasonably available alternative sources of water.
Major aquifer	A high-yield aquifer system of good quality water.
Minor aquifer	A moderate-yield aquifer system of variable water quality.
Poor aquifer	A low- to negligible-yield aquifer system of moderate to poor water quality.
Special aquifer	An aquifer system designated as such by the Minister of Water Affairs and Forestry, after due process.





Basic supply: South African challenge - 1994

Rural population	17.8 million
Rural people below RDP	12 million
Total population	38.6 million
Total people below RDP	15.8 million



National Groundwater Quality Programmes

Development of regulatory initiatives and continuous improvement in the effectiveness of protection of groundwater will be achieved through national groundwater quality programmes.

- **Community water source protection;**
- **Aquifer classification;**
- **National groundwater information system development;**
- **Land-use planning;**
- **Best Practice;**
- **Resource level groundwater quality monitoring;**
- **Reserve determination;**





Implementation – Foundational Knowledge and Methodologies (Examples)

(1995). WRC Report No TT74/95. An explanation of a set of national groundwater maps.

(1997). WRC Report No K5/841. An assessment of ambient groundwater quality on a national scale in the Republic of South Africa.

(1998). WRC Report No 116/98. Explanatory notes for the aquifer classification map of South Africa.

(2003). WRC Report No 1090-2/1/03. Towards the Resource Directed Measures: Groundwater Component.

(2005). DWAF. Completion of a series of National Hydrogeological Maps covering the whole country at scale 1:500000.

(2006). WRC Report No 1175/1/06. The application of risk assessment modelling in groundwater for humans and livestock in rural communal systems

(2007). WRC Report TT 299/07. Groundwater Resource Directed Measures Manual.

Groundwater Reserve

Initial focus on **Reserve determination in support of water resource allocation**;

1306 Groundwater Reserve (and 1468 for Surface Water) determinations completed since 2000 (RDM Office Status Report, May 2011);

80% ad hoc water use license-related (protection of linked surface water);

20% protection of groundwater resources;

No Resource Quality Objectives to date, because Classification of significant resources has not started.

Source Protection Zoning

- General

Many countries worldwide have implemented groundwater protection zones (also called groundwater supply protection areas or wellhead protection zones);

With the **special focus of protecting domestic water** supplies against pollution ;

Most common approach to divide the capture zone of groundwater source in a number of subzones, with decreasing protection requirements with distance from the source.

Challenge: land use control usually the **mandate of local government;**

Implementation of this approach is **lagging behind in developing countries.**

Source Protection Zoning

- Implementation

Highest priority protection measure in the DWAF (2000) policy;

Feasibility Study was completed for DWA in 2007;

Recommendation of pilot implementation not yet followed up;

Main reason is that source protection zoning is a Resource Quality Objective which should follow classification;

At a more practical level there is as yet **no systematic information on groundwater use** throughout South Africa.

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Best Practice

(Some Examples)

DWAF (1995). A guideline for groundwater protection for community water supply and sanitation programme.

DWAF (2000). Groundwater and our Health. Poster Series and Teachers Guide.

DWAF (2003). A protocol to manage the potential of groundwater contamination from on -site sanitation. The National Sanitation Programme;

DWAF (2003).The NORAD ‘Groundwater for Community Water Supply’ Toolkit piloted in three Districts.

A Framework for Groundwater Management of Community Water Supply

the dwaf
DEPARTMENT OF WATER AFFAIRS AND FORESTRY

NORAD
DIREKTORATET FOR UTVIKLINGSSAMARBEID
NORWEGIAN AGENCY FOR DEVELOPMENT COOPERATION

TOOLKIT for WATER SERVICES: Number 1.1

Resource Quality Monitoring

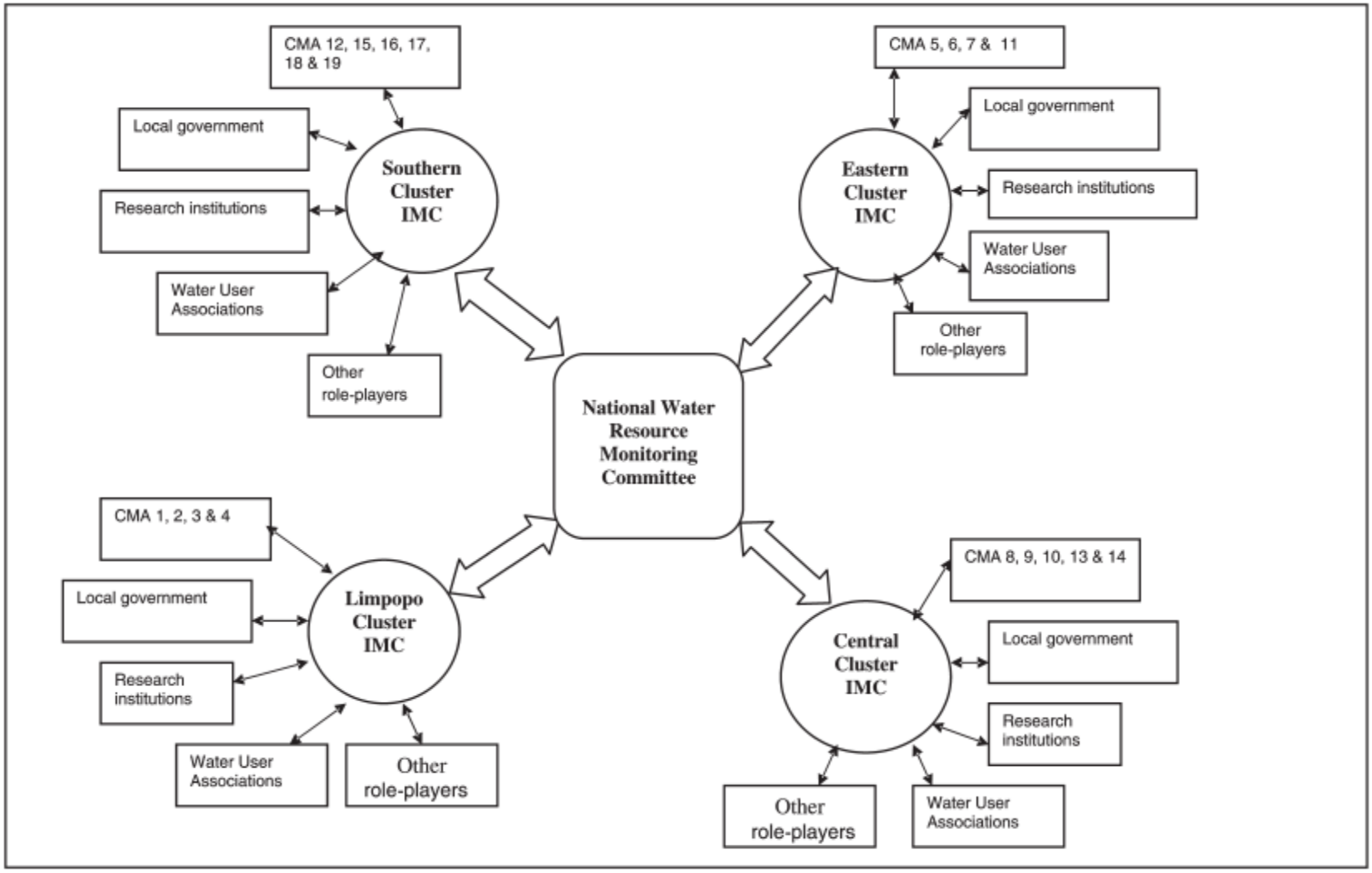
Monitoring required at each management tier (national, catchment, water use / local);

DWAF (2004). A 5–Year Water Resources Monitoring Plan - intention of a National Water Resource Monitoring Committee;

Very limited 2nd and 3rd tier monitoring;

No national assessment as yet (Excellent assessment per catchment for River Health component).

Concept: National Water Resource Monitoring Committee (2006)



Participation

Groundwater (quality) management **needs nationally facilitated local action** (organized stakeholder participation);

Water User Associations are seen as particularly important for management of common groundwater resources;

Importance of this can be seen in the Tanzania **Water Resources Management Act, 2009,** in which **grassroots stakeholder participation** has been institutionalized (Basin Boards, Sub Basin Committees, Water User Associations, Water User Groups).





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Capacity

Policy – recommendation: Owing to the emphasis on surface water in the past, **capacity for groundwater quality management is limited**. This will need attention during the restructuring stage;

By contrast, the restructuring of the DWAF Groundwater Function in 2003 has led to a serious dilution of capacity;

Renewed petition: **Continued need for strong national groundwater player** that is able to lead capacity development and draw on the external groundwater capacity (private and academic sector)

(Submission to Portfolio Committee on Water Affairs and Forestry, 2008; DWA Groundwater Strategy, 2010)





DWA Region Perspective into Groundwater Resource Management

Operational, management and regulation level functions still **all carried out by regional DWA offices.**

Ideally should be distinction between development / management / protection (CMA; loc. govt. and user) and regulation (DWA);

Reactive type management situation rather than proactive management

Very **little groundwater management at municipal level** - heavy reliance on DWA and private sector (geoconsultants)

Lack of sufficient high quality data being readily available for assessments

Regional monitoring **only where Regions have capacity**; local level monitoring almost non-existent.

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Conclusions (1)

- Groundwater resources can not yet be adequately valued and utilized sustainably, because there are **no statistics available on their use** by area and sector;

- Groundwater **resource protection**, in particular for the highest priority sources for domestic supply, is **not yet taking place**;





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Conclusions (2)

- The overarching reason is that local **groundwater resources need local action** and **organized stakeholder participation**, whereas the **delegation of water resources management** to a lower level (CMAs) is **not yet functional;**

- At an operational level, systematic resource protection is not yet possible, because the **classification** of significant water resources has **not yet taken place**;





Conclusions (3)

- The **intended strategy integrating component** to 'secure' sustainable supplies of acceptable quality' appears to be **missing** in present institutional arrangements;

- This is back again in the **2007 Protocol for Catchment Management Strategies**;

- Overall **declining capacity** in the government **Geohydrology function** is a concern and will seriously hamper resource protection implementation, if not addressed.





Outlook - Roadmap for the Africa Groundwater Commission, 2008

‘There is an increasing recognition that groundwater in Africa has a strategic role to play towards the highest development goal, the socio-economic upliftment of millions of people still living in abject poverty’.

Vision - ‘An Africa where groundwater resources are valued and utilized sustainably by empowered stakeholders’.

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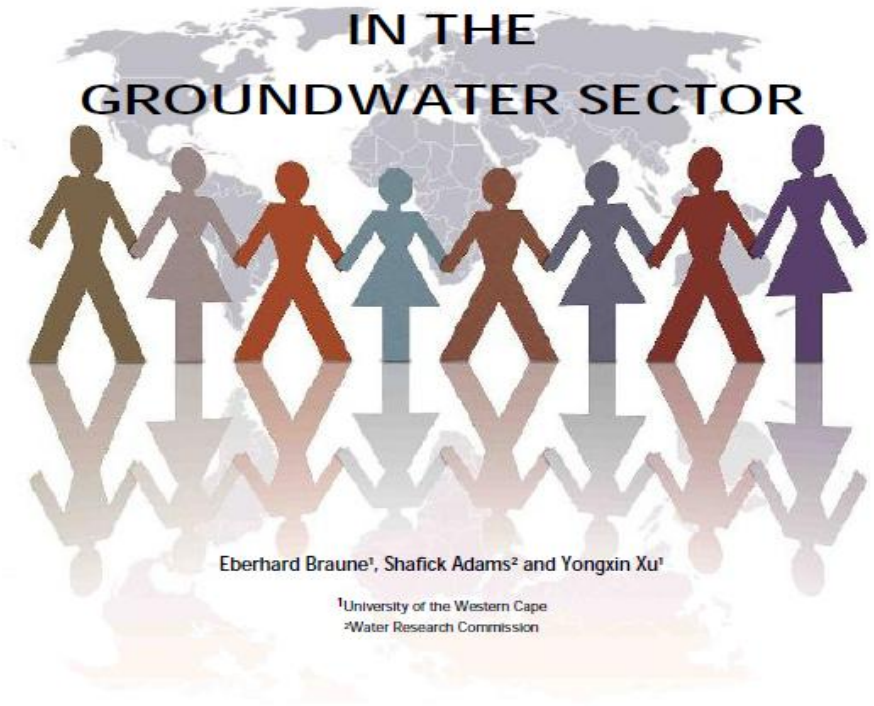
ASSESSING THE IMPACT OF RESEARCH FUNDED BY THE WATER RESEARCH COMMISSION ON CAPACITY BUILDING IN THE GROUNDWATER SECTOR



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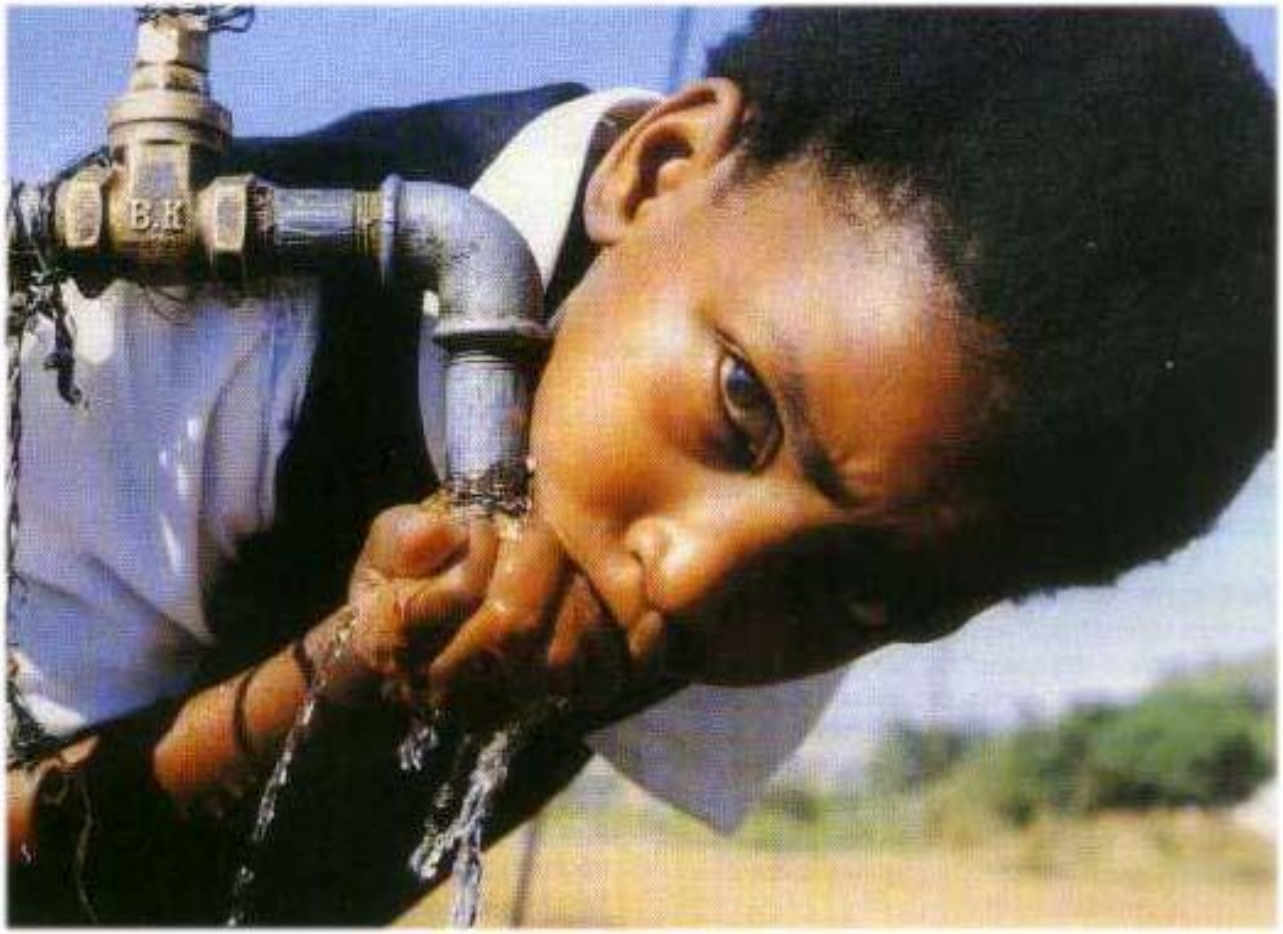
[1]University of the Western Cape
[2]Water Research Commission

“Some for all, forever - together”

Thank you



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