



Groundwater in South Africa

Shafick Adams



Several sources of alternative water resources:

1. Fog (harvested using fog nets)
2. Desalination (seawater, brackish groundwater)
3. Rain water (harvested from roofs and in-field - agriculture)
4. **Groundwater (enhanced recharge, deep groundwater)**
5. Greywater (direct and indirect reuse)
6. Storm water (harvested and stored in detention reservoirs, recharged to aquifers)
7. Mine water (acid mine drainage, non-impacted)
8. Wastewater (direct and indirect reuse)
9. Cloud seeding to enhance rainfall

Diversifying supply mix



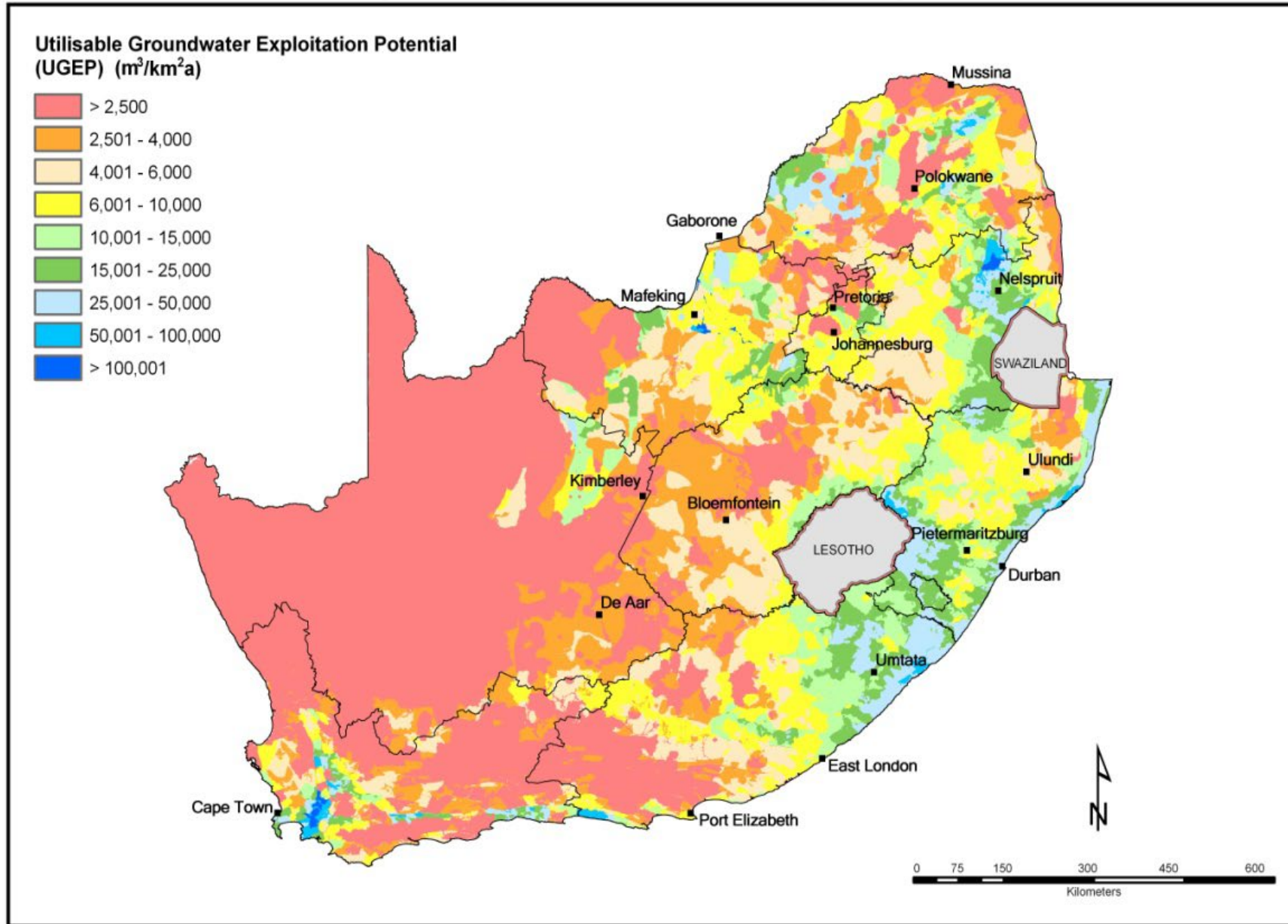
10. Improved prediction of climate and hydrological responses



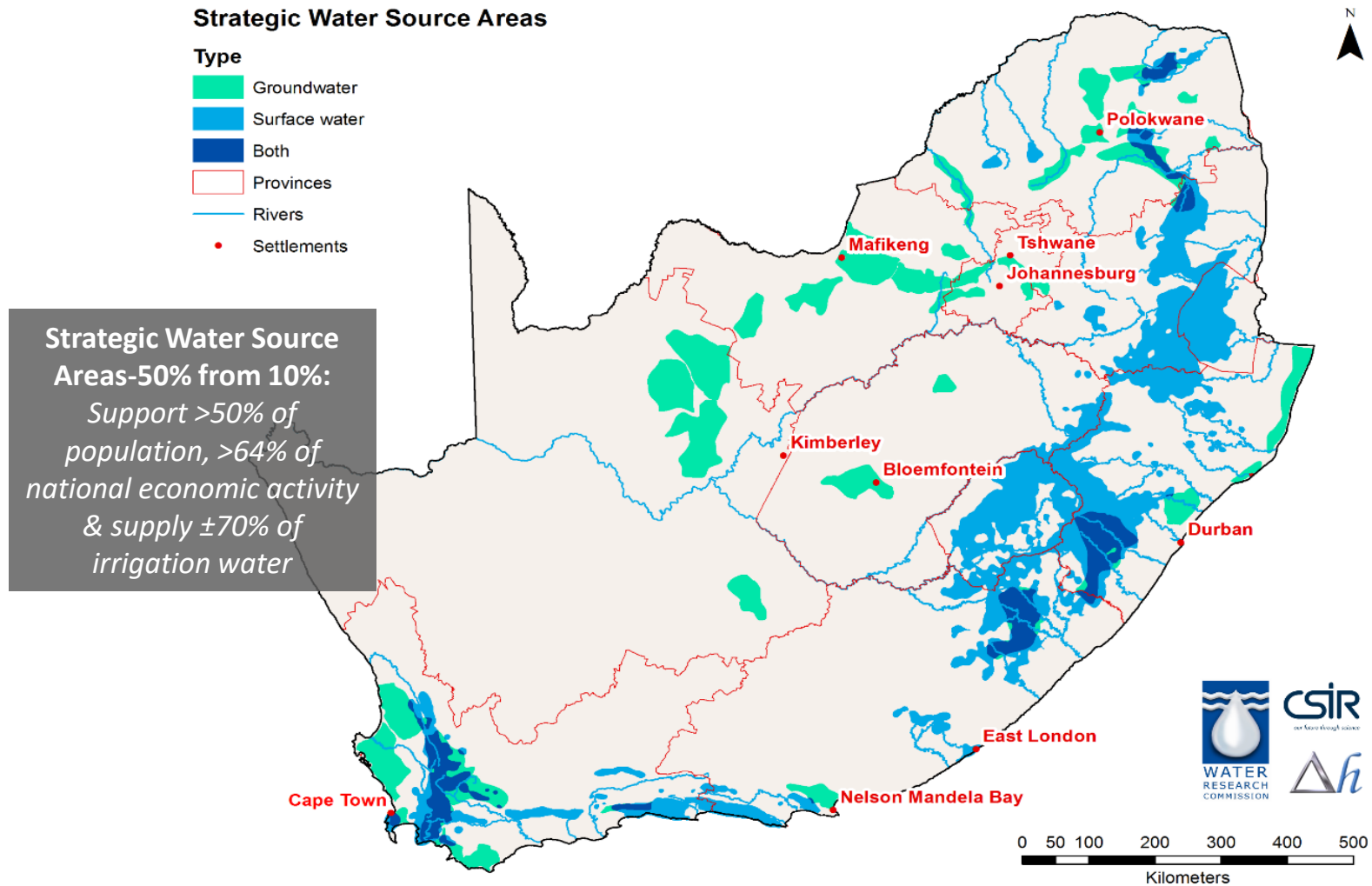
10. Water sensitive design
11. Water wise use & behaviours
12. Water Conservation and Demand Management (water saving devices, toilets, etc.)
13. Efficient agricultural practices
14. Enforcement of bylaws and regulations
15. Good land use planning

= Water – Food – Energy – Environmental - Economic Security

Zoomed out perspective – high potential areas

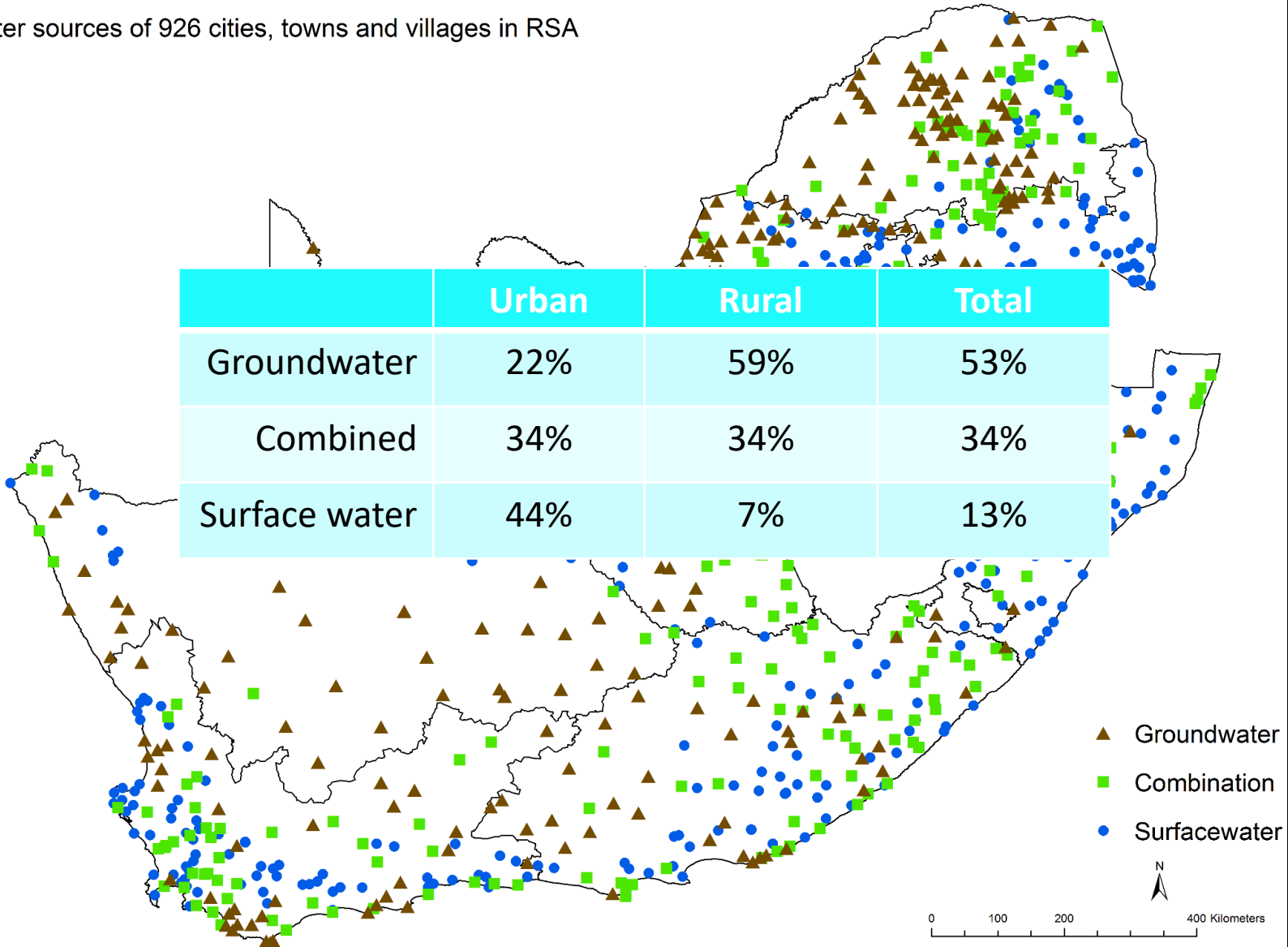


Zoomed out perspective – major source areas

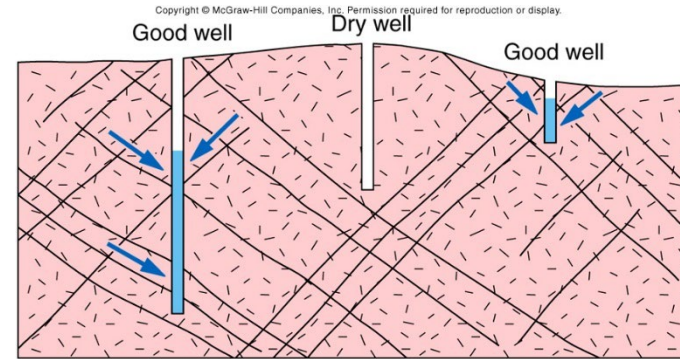
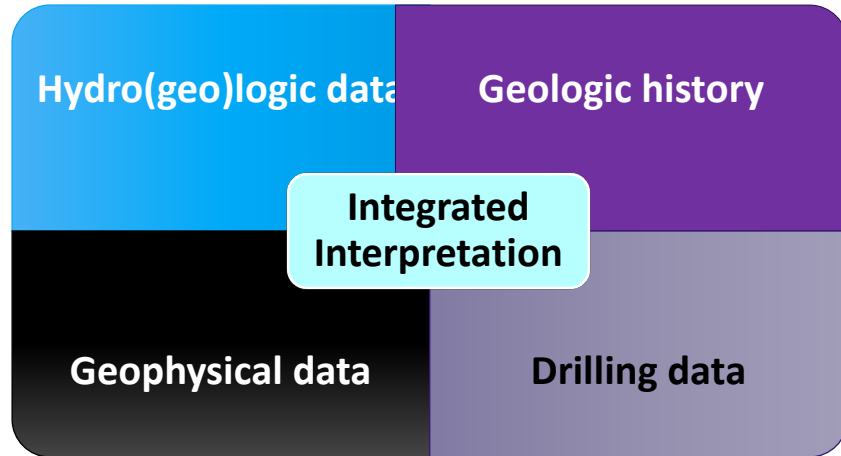


Source Water – Cities, Towns & Villages

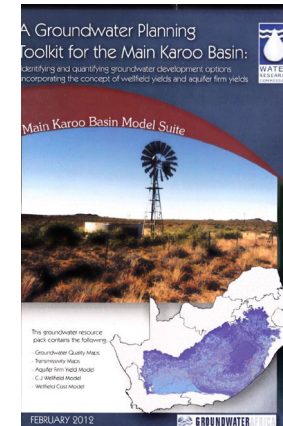
Water sources of 926 cities, towns and villages in RSA



Specialised field Localised resource



vs



Procurement approach is problematic

Overview of Groundwater in South Africa

- 13-15 % of water supplied is from groundwater.
- 60% of communities supplied by groundwater and increases to 90% for some provinces.
- **Total volume of available** renewable groundwater is estimated to be between **10 343 million m³/annum (7 500 million m³/annum under drought conditions)**.
- **Current use** is estimated between **2 000 – 4 000 million m³/annum**.
- Prior to 1998 – Groundwater was considered ‘Private’ and did not feature prominently in any water resources planning.
- Current act – State is the custodian = ‘Public’ water and Prescribes the use of the principles of IWRM.
- Groundwater Strategy > National Water Resources Strategy
- **Groundwater guidelines, tools and know-how**

Groundwater Status Quo

Groundwater schemes fail because:

- Lack of infrastructure maintenance, lack of monitoring
- Lack of buy-in, institutional support
- Funding models

- Borehole yields conflated with wellfield yields, in turn conflated with aquifer yields
- Poorly defined impacts of use
- Aquifer assessment lags (too far) behind infrastructure development
- Groundwater yields may be under-estimated because of application of the water balance method

Related to institutional capacity

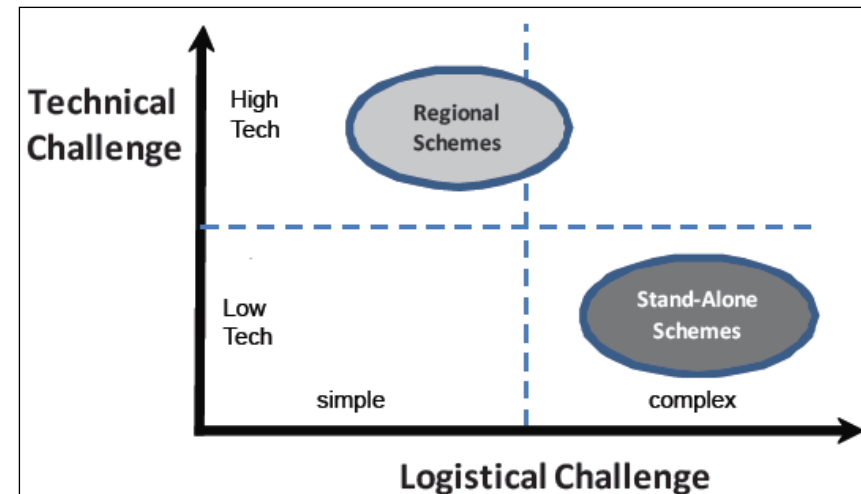
Related to technical challenges

Groundwater can service a range of scales

	Surface		Groundwater		WW Reuse	Greywater	Desal GW	Desal Sea	Stormwater Harvesting	AMD	Rainwater Harvesting	Fogwater
City	Blue		Blue	Yellow	Blue		Blue	Blue	Blue	Blue		
District	Blue		Blue	Yellow	Blue		Blue	Blue				
Village Connected	Blue	Yellow	Blue	Yellow	Yellow	Blue	Yellow	Blue				
Household Connected	Blue	Yellow	Blue	Yellow		Blue					Yellow	Yellow
Village Not Connected		Yellow		Yellow		Blue	Yellow				Yellow	Yellow
Household Not connected		Yellow		Yellow		Blue					Yellow	Yellow

8-13% of Tshwane's water comes from groundwater (springs)

In some provinces up to 90% of the area is serviced by groundwater for rural supply



Banking excess surface water underground

Prevents evaporation and climate change adaptation strategy

ARTIFICIAL RECHARGE STRATEGY
Version 1.3 - June 2007

The diagram illustrates the process of artificial recharge. On the left, an infiltration basin receives water from a river. On the right, a treatment plant processes water, which is then pumped into another infiltration basin. Below the surface, the water table is shown with abstraction boreholes drawing water from the aquifer and injection boreholes returning water to it. The water table level is indicated by a dashed line.

water & forestry
Department:
Water Affairs & Forestry
REPUBLIC OF SOUTH AFRICA

Water Research Commission

**PILOT ARTIFICIAL RECHARGE SCHEMES:
TESTING SUSTAINABLE WATER RESOURCE
DEVELOPMENT IN FRACTURED AQUIFERS**

The cover features a stylized blue and white graphic of a water droplet or a cross-section of a fractured aquifer, with a yellow sun in the background.

Artificial Groundwater Recharge
**WISE WATER MANAGEMENT
FOR TOWNS AND CITIES**
Ricky Murray

The cover includes a photograph of a water treatment facility with large tanks and a landscape view of a town with a reservoir in the background.

CSIR
ENVIRONMENTAL
Water Research Commission

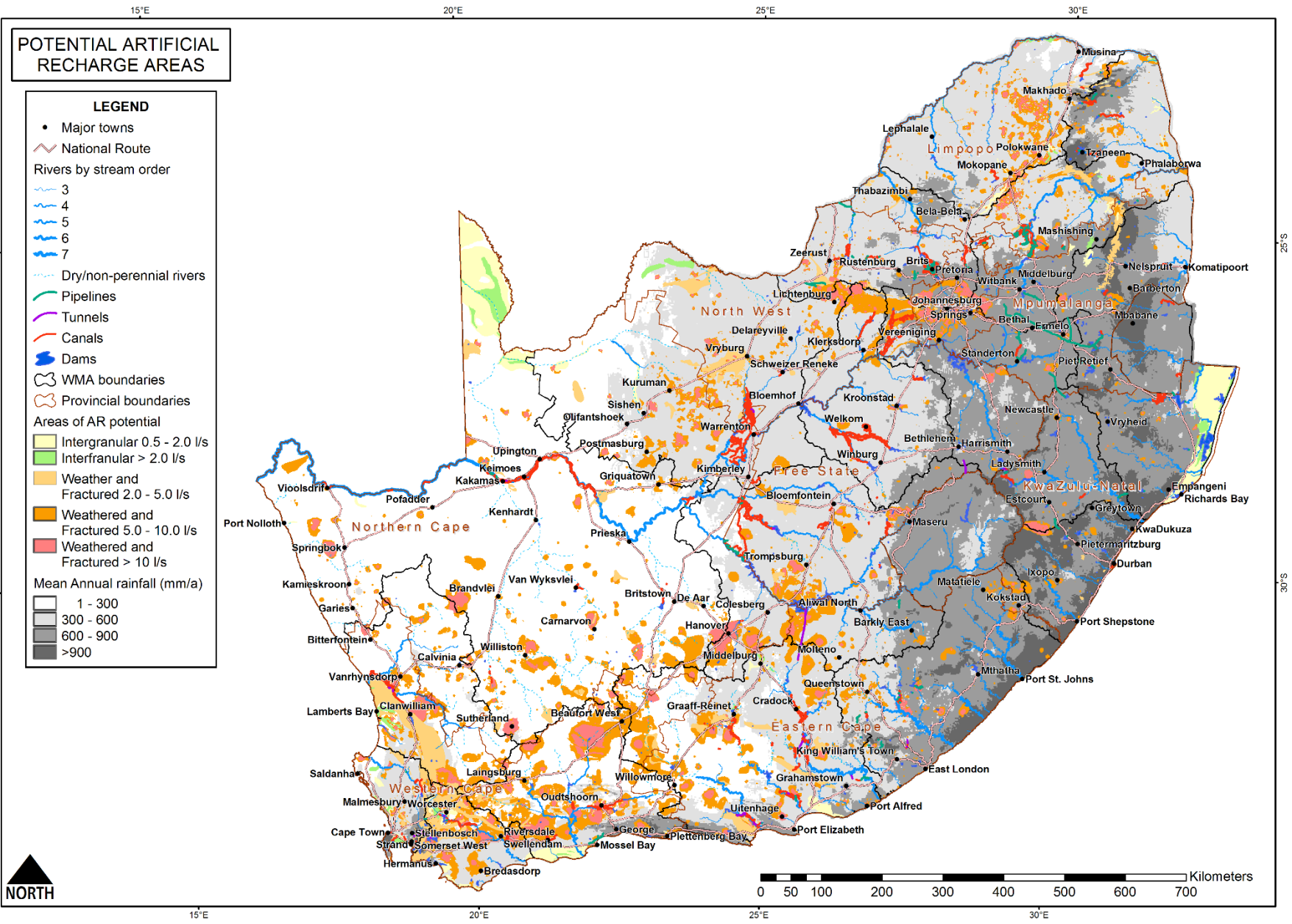
**Artificial Recharge: Developing Sustainable
Water Resources in South Africa**
A resource package of reports
and visual materials

The cover features a large water droplet graphic containing various images related to water management, including a map of South Africa, a reservoir, and a water treatment plant. Logos for water affairs and GroundwaterAfrica are present.

water affairs
Department
Water Affairs
REPUBLIC OF SOUTH AFRICA

GROUNDWATERAFRICA

2010



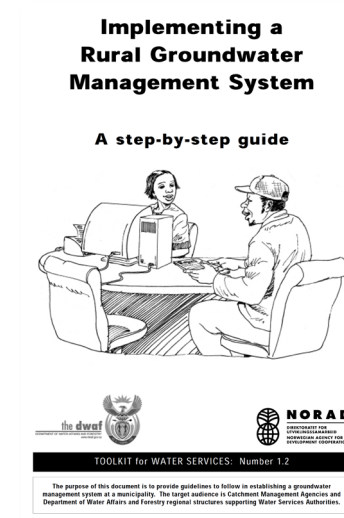
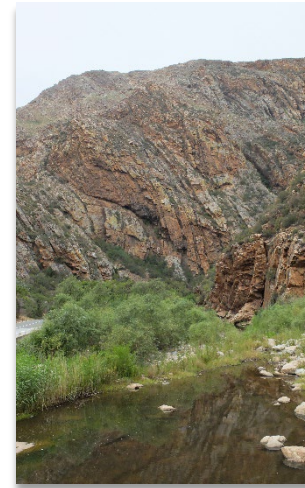
We have:

Support Resources

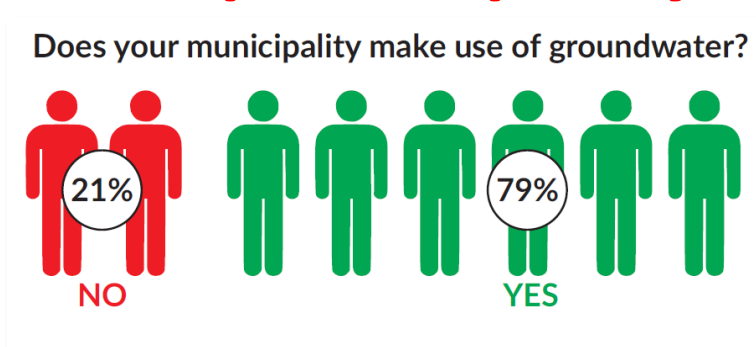
Tools & guides

Decision-making support tools & know-how

Policies and strategies



- **But poor capacity at the operational level**



- **Operating rules for Dams but not for Groundwater**

- **No research to policy conversion**

Development of a 'Blue Drop' type Scoring System for Groundwater Management at Municipal Level

The difference



- **Proper exploration**
- **Driven by the scientific method**
- **Professionals were procured for all stages vs “contractors” with no geological and hydrogeological expertise and only a drill rig.**

Nelson Mandela Bay area

Recommendations

- Skills at the operational level (municipal) to manage groundwater schemes.
- Developing operating rules for groundwater schemes.
- Improved management of water use and quality (measurements) and landuse planning.
- Include groundwater evaluations in Blue and Green drop system.
- Enhance managed aquifer recharge roll-out as a climate adaptation strategy.
- Improve procurement processes.
- Regulate drilling and data capture. Legislation ...
- Protect recharge and source water areas.
- **Reintroduce Groundwater Directorate or similar.**
- Community involvement in groundwater development.
- Unconventional gas ... regulations – current.
- Groundwater also needs treatment.
- Regional hydrogeologist to oversee groundwater development.



THANK YOU

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