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**Groundwater Governance in South Africa Case
Study: Dinokana / Lobatse Transboundary
Dolomite Aquifer**

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Adams**

Too Big to Fail: The paradox of groundwater governance

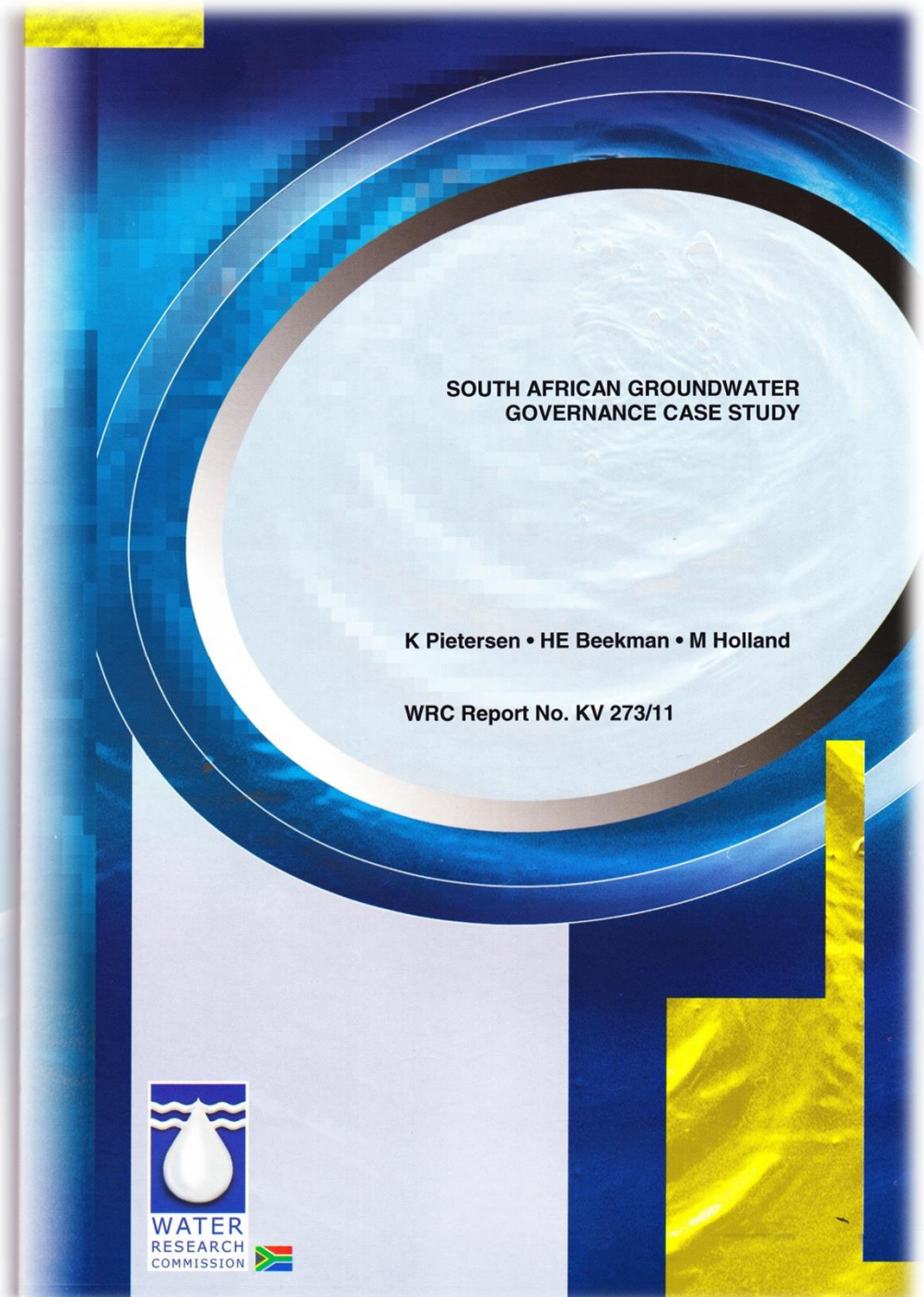
- “ Understand the impediments
 - to improved governance of groundwater
 - to groundwater forming an integral part of IWRM in developing countries
- “ Explore groundwater opportunities for adaptation to climate change

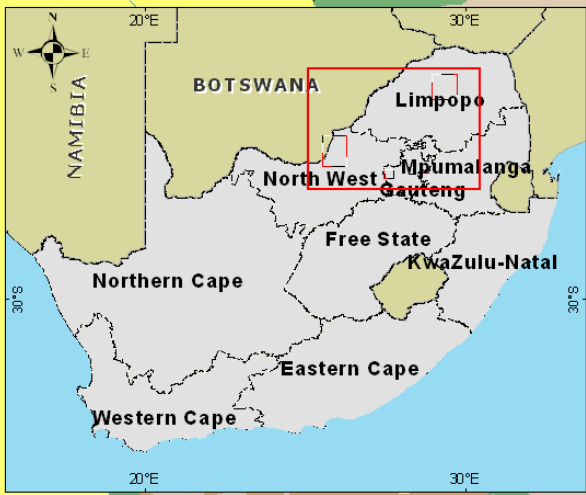
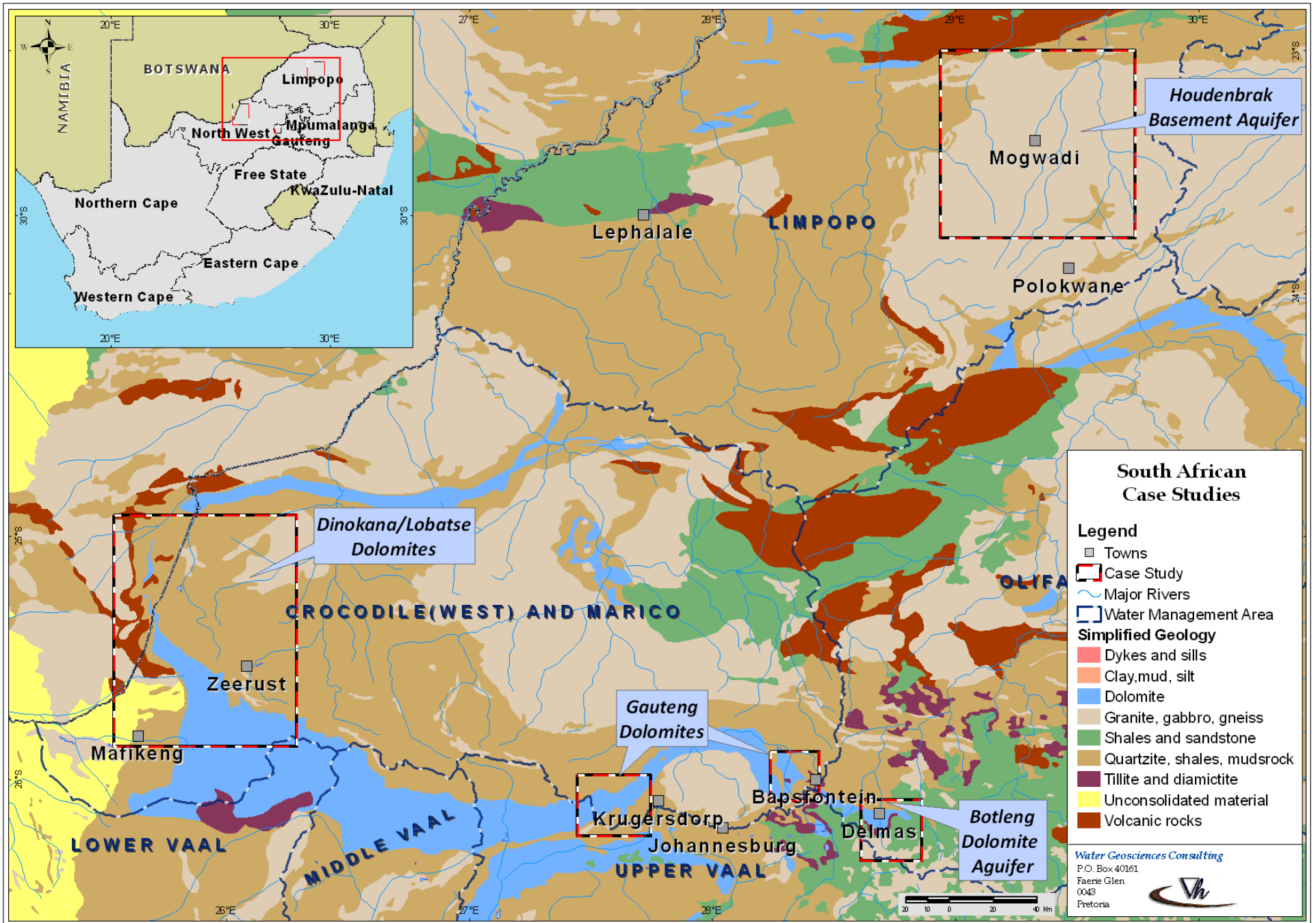


“ Groundwater governance analysis

- . National strategic, policy and planning levels
- . Local institutional levels
- . Local level:
 - “ Botleg Dolomite Aquifer
 - “ Gauteng Dolomite Aquifers
 - “ Houdenbrak Basement Aquifer
 - “ **Dinokana-Lobatse Transboundary Dolomite Aquifer**

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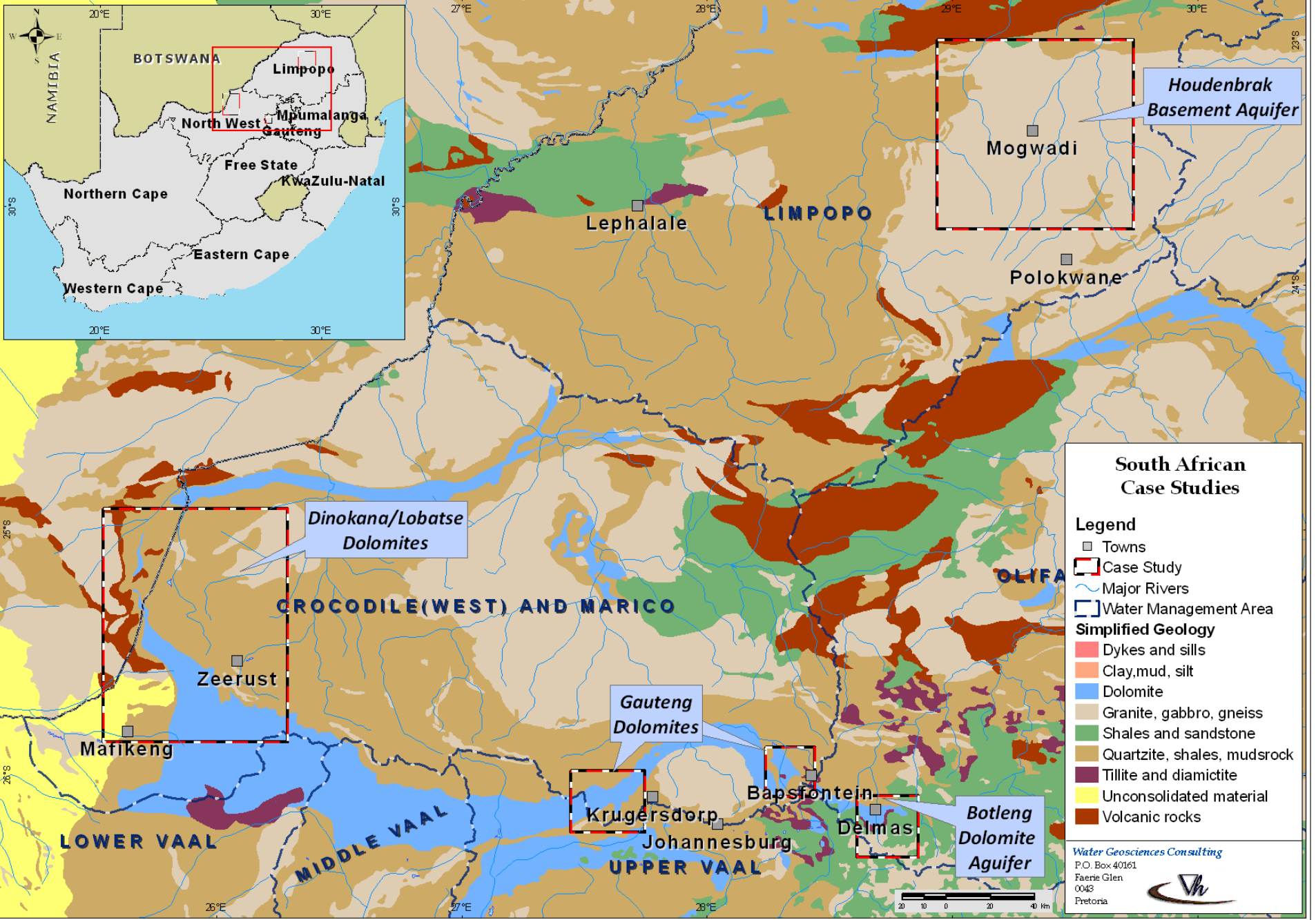
CROCODILE (WEST) AND MARICO

LOWER VAAL

MIDDLE VAAL

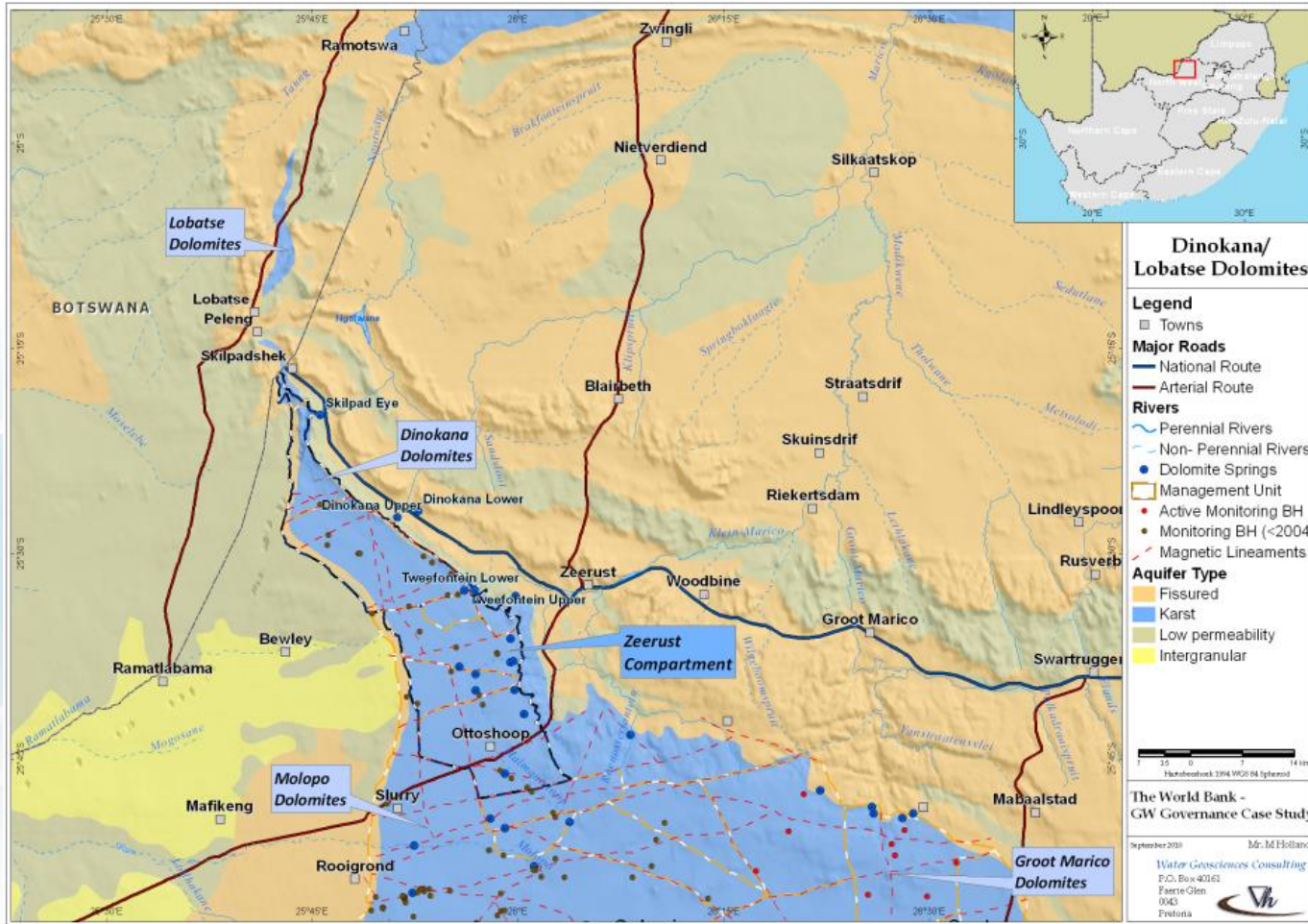
UPPER VAAL

OLIFANT



Dinokana / Lobatse Dolomite Aquifer

“ Insufficient knowledge on the potential and limitations of the aquifer



Karst aquifer (Malmani Dolomite):

- “ Transboundary aquifer - Botswana and South Africa
- “ High S & T: > 1000 m²/d
- “ BH yields >25 l/s
- “ Recharge: 5-15% MAP (400-600 mm)
- “ Vulnerable to over-exploitation and pollution


Groundwater use:

- “ Domestic water supply (rural/municipal);
- Agriculture (irrigation);
- Industry
- “ Three wellfields to meet demand of Zeerust and surrounding communities (5.5 Mm³/a)
- “ Abstraction rates exceed sustainable abstraction limit

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Typologies and threats

Typology	Situation / process	High Risk	Medium Risk	Low Risk
Risk of extensive quasi-irreversible aquifer degradation and subject to potential conflict amongst users	Intensive exploitation (leading to land subsidence, saline or polluted water intrusion)	✓		
	Vulnerable to pollution from land surface (vulnerability, pollution)	✓		
	Depletion of non-renewable storage (in aquifers with low contemporary recharge)			✓
Potential water use conflict but not at risk of quasi-irreversible aquifer degradation	With growing large-scale abstraction (especially in aquifers with high T/S ratios)		✓	
	Vulnerable to point-source pollution (vulnerability, pollution)	✓		
	Shared transboundary resource		✓	
Insufficient (or inadequate use of) scientific knowledge to guide development policy & process	Potential to improve rural welfare & livelihoods (not fulfilling MDG potential)		✓	
	Natural quality problems (e.g. As, F)			✓
	Scope for large-scale planned conjunctive use (urban W/S or irrigated agriculture)		✓	

Dinokana / Lobatse Dolomite Aquifer

Local groundwater management

Water management institutions:

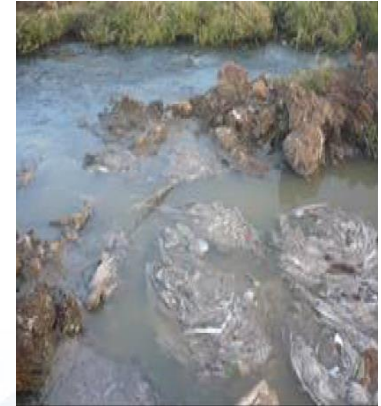
- “ CMA not established (form part of the Limpopo WMA)
- “ DWA Regional Office interim CMA
- “ Ramotshere Moiloa Local Municipality / Ngaka Modiri Molema District Municipality.
- “ Botshelo Water Board operates as a Water Services Provider

Blue and green drop certification:

- “ Blue drop: Water quality management remains issue
 - Quality of drinking water in most of the supply systems show non-compliance to national legislation (SANS 241) and thereby pose a significant risk of infection
- “ Blue drop : Average score 40.72 for NMMM DM (2012)
- “ Green drop: Average score of 28.4%

Knowledge and capacity:

- “ Groundwater studies (the issue no implementation of recommendations / no follow-up)



Dinokana / Lobatse Dolomite Aquifer

Evaluation of groundwater governance provisions - effectiveness

Capacity	Criterion	Context	Prov.	Inst. capacity
Technical	Basic hydrogeological maps	For identification of groundwater resources	3	1
	Groundwater body/aquifer Delineation	With classification of typology	3	1
	Groundwater piezometric monitoring network	To establish resource status	1	1
	Groundwater pollution hazard assessment	For identifying quality degradation risks	1	1
	Availability of aquifer numerical management models	At least preliminary for strategic critical aquifers	2	0
	Groundwater quality monitoring network	To detect groundwater pollution	1	1
Legal & Institutional	Water well drilling permits & groundwater use rights	For large users, with interests of small users noted	2	1
	Instruments to reduce groundwater abstraction	Water well closure/constraint in critical areas	1	1
	Instruments to prevent water well construction	In overexploited or polluted areas	1	1
	Sanction for illegal water well operation	Penalizing excessive pumping above permit	0	0
	Groundwater abstraction & use charging	Resource charge on larger users	1	1
	Land use control on potentially polluting activities	Prohibition or restriction since groundwater hazard	0	0
	Levies on generation/discharge of potential pollutants	Providing incentives for pollution prevention	0	0
	Government agency as groundwater resource guardian	Empowered to act on cross-sectoral basis	1	1
	Community aquifer management organisations	Mobilising and formalising community participation	1	0
Cross-Sector Policy Coordination	Coordination with agricultural development	Ensuring real water saving and pollution control	1	1
	Groundwater based urban/industrial planning	To conserve and protect groundwater resources	0	0
	Compensation for groundwater protection	Related to constraints on land-use activities	0	0
Operational	Public participation in groundwater management	Effective in control of exploitation and pollution	1	1
	Existence of groundwater management action plan	With measures and instruments agreed	2	1

“ Management measures

- . Potential and limitations of aquifers
 - “ Quantification of key parameters
- . Aquifer management guidelines for decision making
- . Incorporation of the principles of uncertainty and risk of failure - using probability analysis in assured yield analyses
- . Continuous monitoring of aquifer performance and periodic assessment of exploitation potential

“ Institutional measures include:

- . Timescales for the establishment of CMA, and the various Water User Associations (WUA)
- . Transformation of WUA - diversity in stakeholders
- . Communication
 - “ regular monitoring of groundwater resources needs to be resuscitated, the results turned into useful information products, and these must be communicated to decision makers
 - “ Much closer communication between the DWA Regional Office and the DWA National Office is needed
- . Recuperation of revenue for water charges

Management measures – 4 case studies

Macro policy adjustments	Regulatory provisions	Community participation
<ul style="list-style-type: none"> • Integration of NGS into NWRS, CMS, and other strategies • Include groundwater abstraction in the water pricing strategy • Harmonize water related legislation • Integrate groundwater resource planning between different spheres of government 	<ul style="list-style-type: none"> • Registration of new wells and boreholes • Review of general authorizations • Registration of drillers • Registration and verification of water use • Simplification of groundwater licensing (e.g. single license for DWA and DEA) • Timeous issuing of water use license • Compliance monitoring and enforcement • Protection zoning around boreholes and pollution pathways • Establish regulations for borehole construction • In stressed catchments implement compulsory licensing 	<ul style="list-style-type: none"> • Accelerate establishment of CMAs and WUAs • Establishment of Aquifer Management Committees • Stakeholder engagement in decision-making

“ Observations in general dolomite aquifers

- . Important groundwater resource
- . Less is known today about the dolomite aquifer systems than in the 1970s/1980s due to absence of investigations and monitoring since that time
- . Dewatering is taking place
- . Cannot separate surface water from groundwater
- . Exploitation of dolomite requires continual monitoring and a strict pumping regime that limits drawdown

” Thank you

