



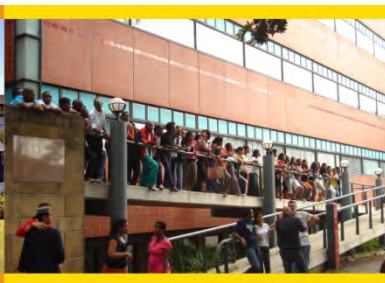
## Climate change, groundwater and the law – exploring the connections in South Africa



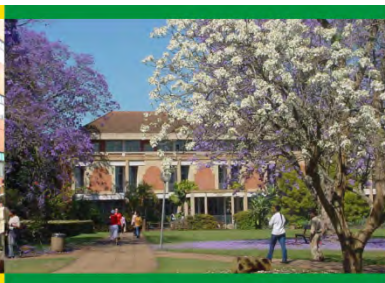
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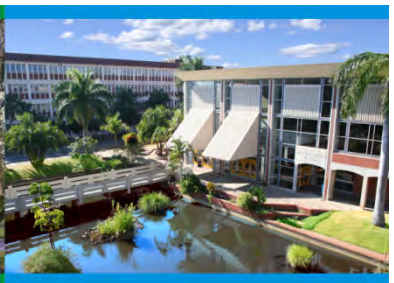
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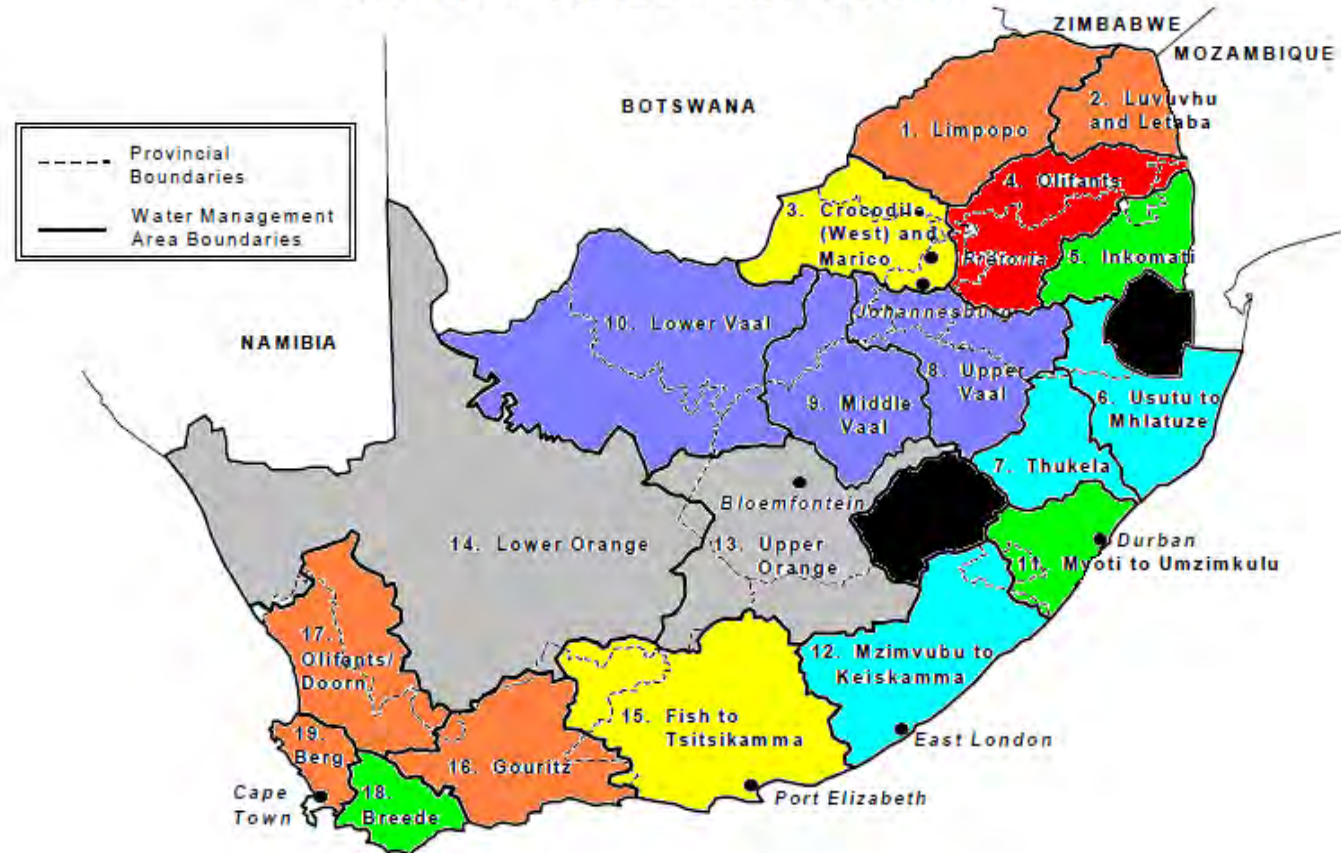
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UKZN INSPIRING GREATNESS

# WATER MANAGEMENT AREAS





UKZN INSPIRING GREATNESS

# SA's groundwater

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- The total volume of available, renewable groundwater in South Africa (the Utilisable Groundwater Exploitation Potential, or UGEP) is 10 343 million m<sup>3</sup>/a (or 7 500 million m<sup>3</sup>/a under drought conditions)



Utilisable Groundwater Exploitation Potential (UGEP) ( $m^3/km^2/a$ )

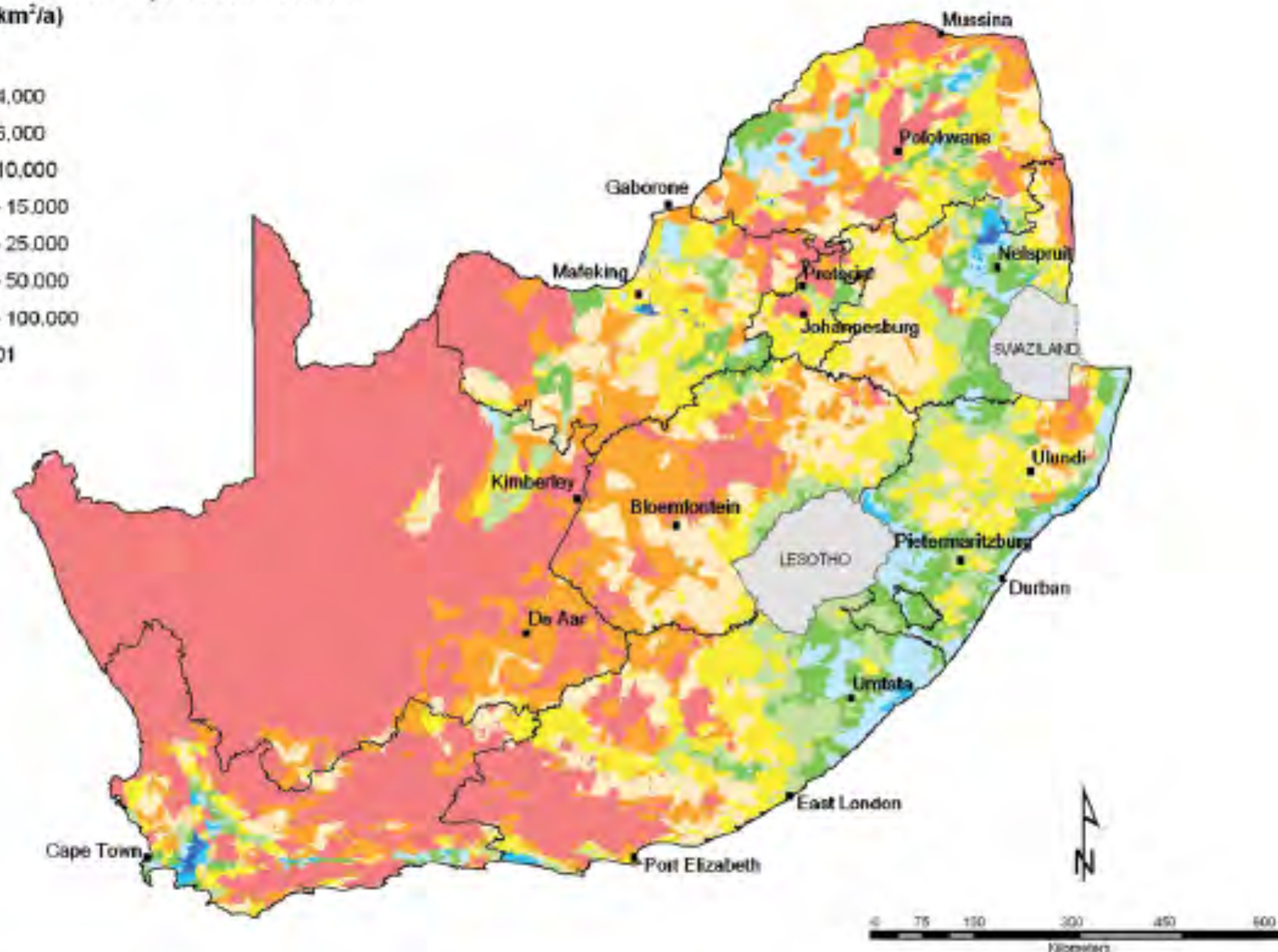
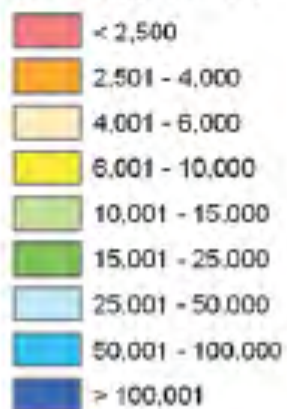


Figure 3-1 Utilisable groundwater exploitation potential for South Africa (GRA 2)

# UGEP for water management areas

No.	Water Management Area	UGEP (million m <sup>3</sup> /a)
1	Limpopo	644.3
2	Luvuvhu and Letaba	308.9
3	Crocodile West and Marico	447.8
4	Olifants	619.2
5	Inkomati	667.8
6	Usutu to Mhlatuze (including Swaziland)	862.0
7	Thukela	512.6
8	Upper Vaal	564.0
9	Middle Vaal	398.1
10	Lower Vaal	645.1
11	Mvoti to Umzimkulu	704.9
12	Mzimvubu to Keiskamma	1 385.9
13	Upper Orange (including Lesotho)	673.0
14	Lower Orange	318.0
15	Fish to Tsitsikamma	542.4
16	Gouritz	279.9
17	Olifants/Doring	157.5
18	Breede	362.9
19	Berg	249.0
<b>TOTAL</b>		<b>10 343.4</b>

Table 3-1 Groundwater Availability per Water Management Area (WMA)

Table 3-1 is after Middleton and Bailey (2009) - WRC Report TT380/0

# Current water use

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- Surface water – approx. 12 000 million m<sup>3</sup>/a
- More than 80% allocated already
- Ground water 10 343 million m<sup>3</sup>/a
- Only 2 000 and 4 000 million m<sup>3</sup>/a currently used

# Groundwater strategy

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- With surface water resources already stretched in South Africa, groundwater should form a very important part of our climate change adaptation strategy in terms of assuring continuity of water supplies. Much work still needs to be done regarding the effects of climate change on technical issues such as groundwater recharge.



# Groundwater use in SA

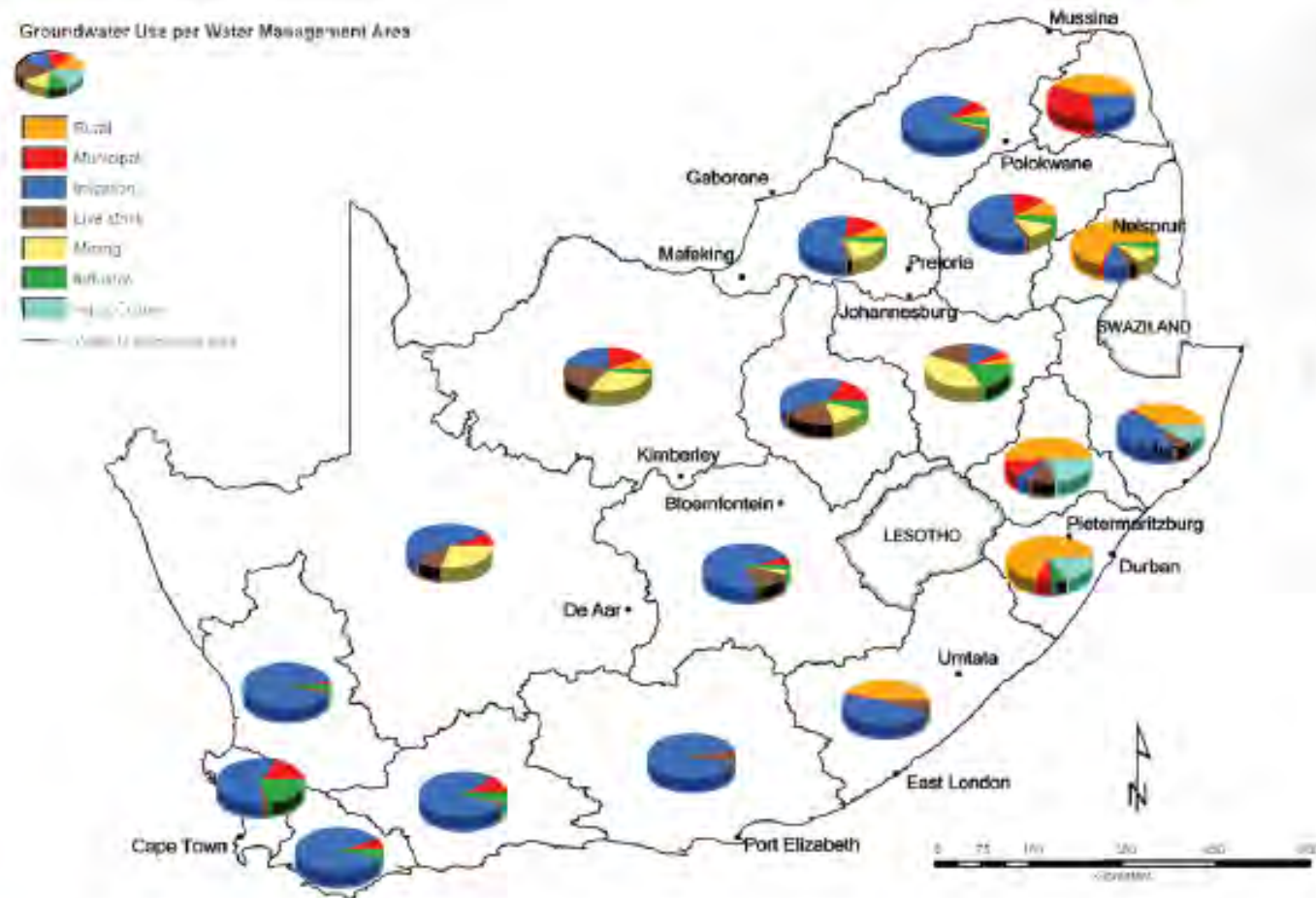


Figure 3-2 Total groundwater use per sector in WMA

# Climate Change

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- Higher temperatures
- Altered rainfall
  - East wetter, inland/west longer droughts
- Increased occurrence of floods and droughts
- Negatively affect surface storage

# Addressing climate change

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- NWRS 2013
- Climate Change Response White Paper 2011
- Water conservation and demand management
- Domestic rainwater harvesting etc

# National Water Resource Strategy 2013

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- The key objectives of a climate change strategy for the water sector include:
- Reduce the vulnerability and enhance the resilience of communities, people, enterprises and ecosystems, to water-related impacts of climate change, particularly for those groups most at risk.
- Improve and enhance water resources management processes to build the required resilience and adaptive capacity.
- Integrate climate change considerations into short-, medium- and long-term water planning processes for water resources and water services.
- Implement the best catchment and water management practices to maximise the degree of water security and resource protection under changing climatic conditions.
- Enhance the human, legal, regulatory, institutional, governance and financial resources and capacity to assist with the effects of climate change on water.
- Undertake focused monitoring and research to ensure the efficacy of water adaptation approaches over the long term.
- Ensure inter-linked climate and hydrological modelling tools that represent the complex interrelated natural systems.

# NWRS – Climate change response

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- Includes:-
  - The DWA will consider all appropriate sources of water for increasing water supply, including groundwater and alternative water supply sources. The use of these will be tested against the climate change scenarios.



# The Law Then

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- 1956 Water Act (and before):
  - Groundwater = ‘private water’
  - Unrestricted use
  - No permission
  - Except Subterranean Groundwater Control Areas

Former Sub-Terrainian  
Groundwater Control Areas

Groundwater Control Area

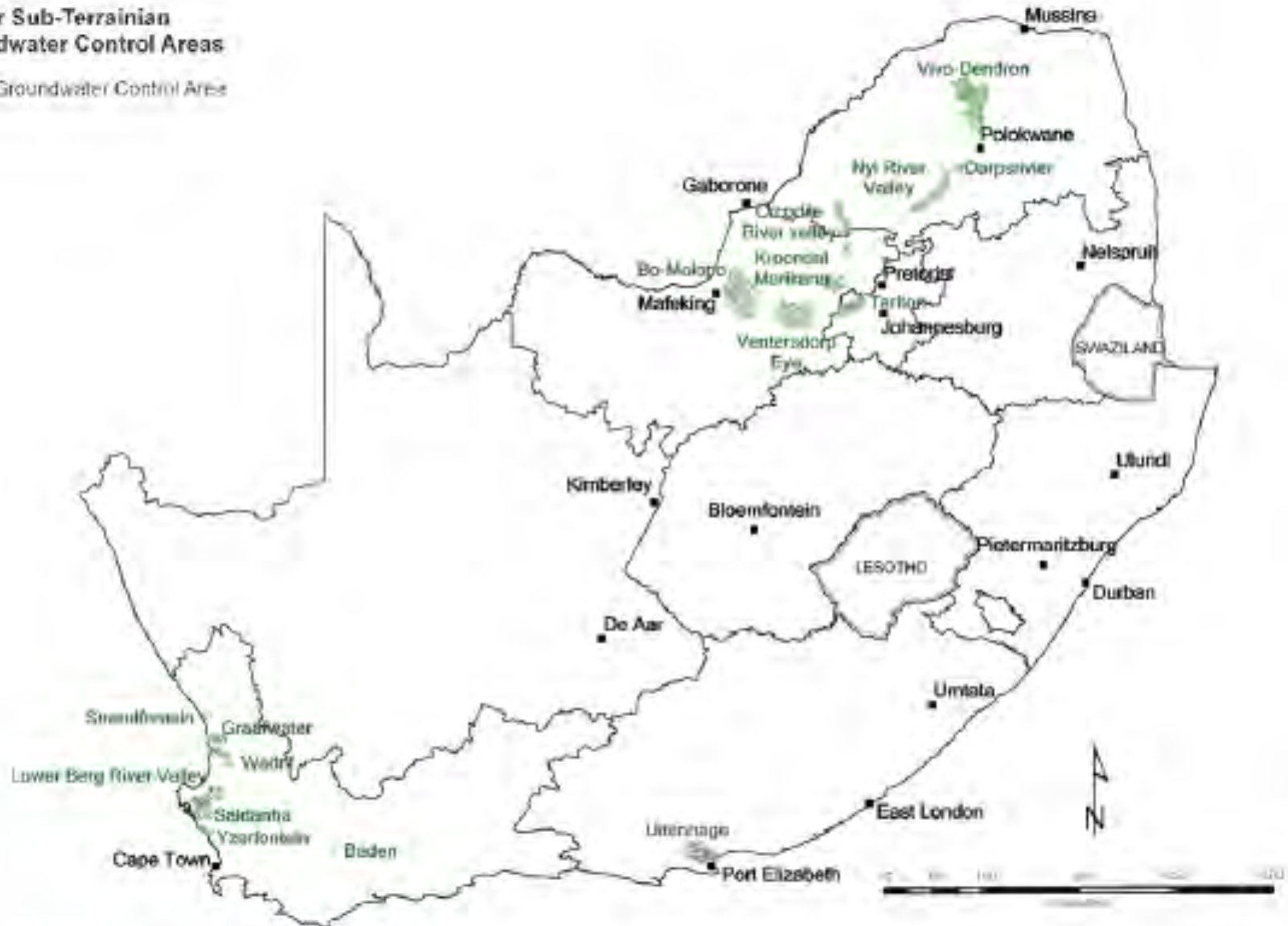


Figure 2-1 Subterranean Groundwater Control Areas

# The Law Now

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- National Water Act 36 of 1998
  - Recognises hydrological cycle
  - Groundwater treated the same as surface water
  - All water use requires a licence, except
    - Existing lawful use
    - General authorisation
    - Schedule 1 use (including personal, de minimis use)

# Case study: Tosca-Molopo

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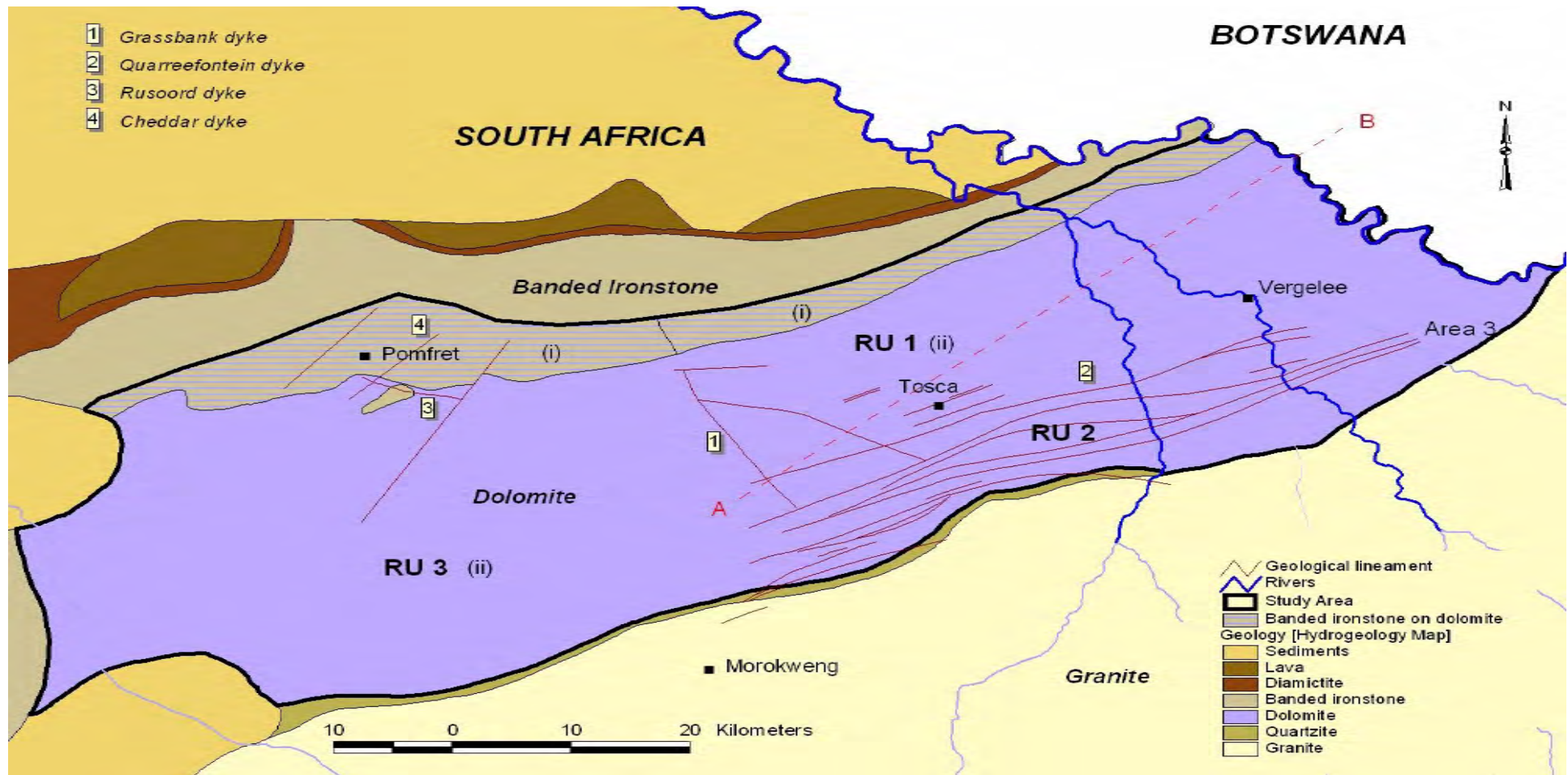


# Tosca-Molopo Case Study

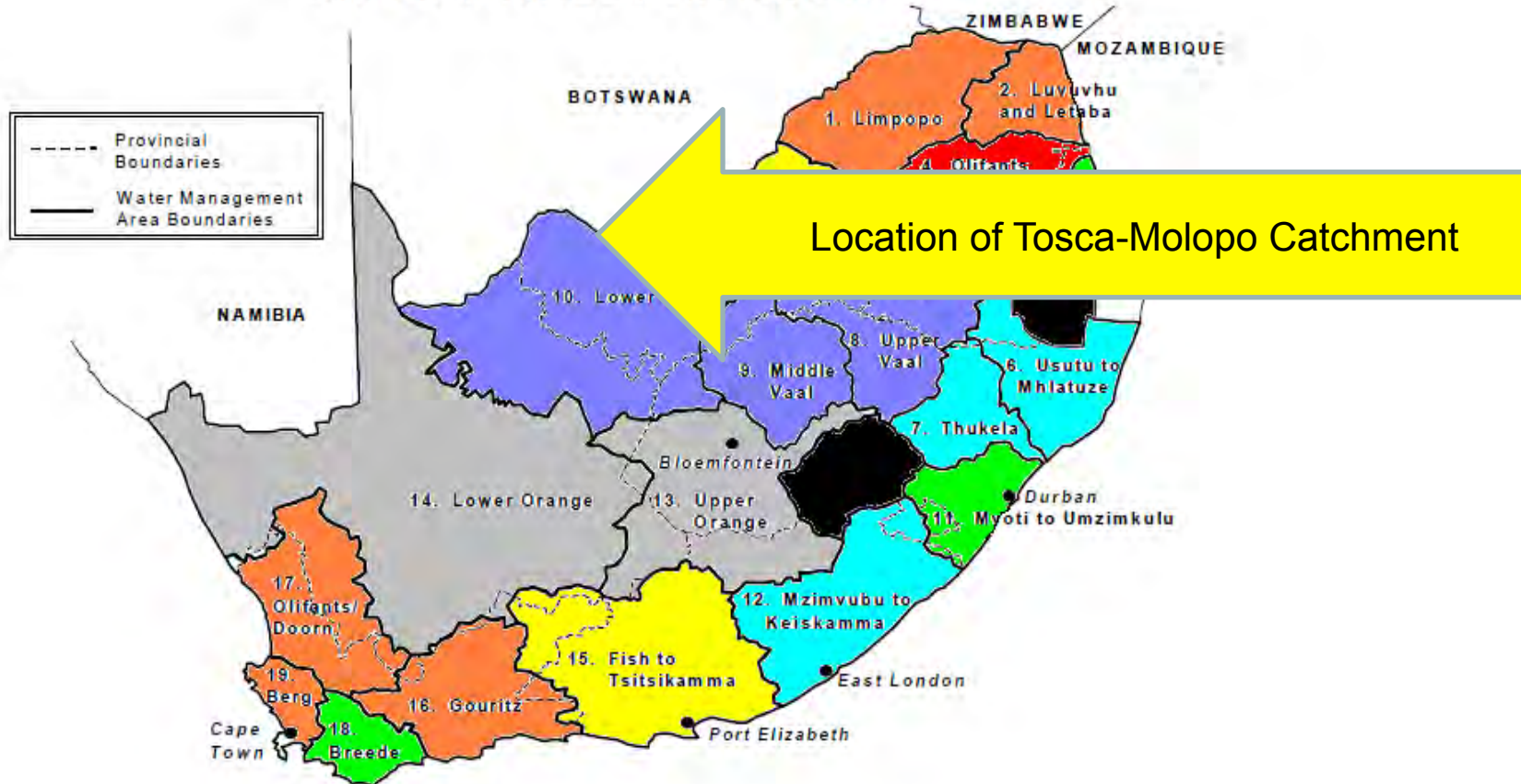




# Tosca Molopo



# WATER MANAGEMENT AREAS



# Tosca Molopo

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- Sole source of water: groundwater
- Water usage prior to compulsory licensing:

Water Use Sector	Requirement (million m <sup>3</sup> /a)	Percentage
Irrigation: Commercial	13.5	59
Irrigation: Emerging farmers	0.35	1.5
Domestic and livestock	±9	38.5
Total	22.8	100

# Tosca Molopo

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- Reserve determination
  - Quantity for basic human needs: 37 000 m<sup>3</sup>/a (0.54% of recharge)
  - Aquatic ecosystems: not considered

**ANNEXURE**

**TOSCA MOLOPO GEOGRAPHIC AREA**

**FINAL ALLOCATION SCHEDULE**

<b><u>ALLOCATION</u></b>		<b><u>VOLUME ALLOCATED</u></b> (m <sup>3</sup> per annum)
Reserve and International Obligations		540 000
Existing Licences		0
Water Set Aside		58 722
<b><u>APPLICANT</u></b>	<b><u>PROPERTY DESCRIPTION</u></b>	
AA Stoltz	Kokomeng Farm No. 178, Portion 2	18 000
ACJ Du Plessis	Zand Vloed Farm No. 218, Portion 1, RE	77 880
AM Steyn	Vaal Bosch Hoek Farm No. 227, Portion 1	98 400
Amos Trust	Westwood Farm No. 7, Portion 0	60 000
Ansna Trust	Blanco Farm No. 173, Portion 1	64 543
Ansna Trust	Hurst Park Farm No. 170, Portion 0	348 750
A van Vuuren	Forres Farm No. 216, Portion 2	231 570
Carroll Family Enterprises (Pty) Ltd	Black Heath Farm No. 90, Portion 0 RE	1 071 000
CJA Engelbrecht	Brentwood Farm No. 181, Portion 0	74 112
CJA Engelbrecht	Brentwood Farm No. 181, Portion 1	74 112



# Relevant legal provisions

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- Essential requirements of licences: section 28
  - Licence period may not exceed 40 years
  - Review period at intervals of not more than 5 years
- Issue of licence no guarantee of supply: section 31
  - The issue of a licence to use water does not imply a guarantee relating to -
    - (a) the statistical probability of supply;
    - (b) the availability of water; or
    - (c) the quality of water.

# Relevant legal provisions

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- **Conditions for issue of general authorisations and licences**
- **29.** (1) A responsible authority may attach conditions to every general authorisation or licence –
- (e) in the case of taking or storage of water -
- (i) setting out the specific quantity of water or percentage of flow which may be taken;
- (ii) setting out the rate of abstraction;
- (iii) specifying the method of construction of a borehole and the method of abstraction from the borehole;
- (iv) specifying the place from where water may be taken;
- (v) specifying the times when water may be taken;
- (vi) identifying or limiting the area of land on which any water taken from a resource may be used;
- (vii) limiting the quantity of water which may be stored;
- (viii) specifying locations where water may be stored; and
- (ix) requiring the licensee to become a member of a water user association before water may be taken; ...

# Relevant legal provisions

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- **Review and amendment of licences**
- **49.** (1) A responsible authority may review a licence only at the time periods stipulated for that purpose in the licence.
- (2) On reviewing a licence, a responsible authority may amend any condition of the licence, other than the period thereof, if -
- (a) it is necessary or desirable to prevent deterioration or further deterioration of the quality of the water resource;
- (b) there is insufficient water in the water resource to accommodate all authorised water uses after allowing for the Reserve and international obligations; or
- (c) it is necessary or desirable to accommodate demands brought about by changes in socio-economic circumstances, and it is in the public interest to meet those demands.
- (3) An amendment contemplated in subsection (2) may only be made if the conditions of other licences for similar water use from the same water resource in the same vicinity, all as determined by the responsible authority, have also been amended in an equitable manner through a general review process.
- (4) If an amendment of a licence condition on review severely prejudices the economic viability of any undertaking in respect of which the licence was issued, the provisions of section 22(6) to (10) apply.
- (5) A responsible authority must afford the licensee an opportunity to be heard before amending any licence condition on review.

# International aquifers

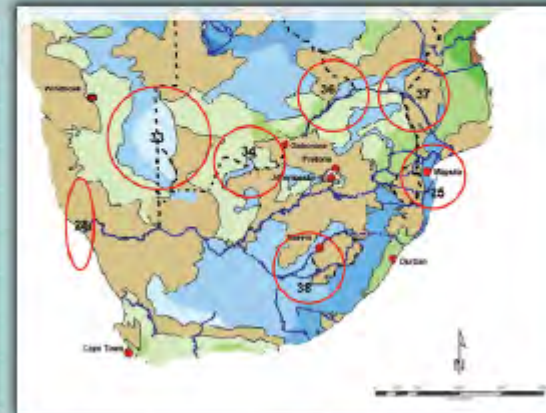


## Box 5-6: Transboundary Aquifers

South Africa is bordered by six countries (Namibia, Botswana, Zimbabwe, Mozambique, Swaziland and Lesotho) along more than 5000km of border. Aquifers extend across international borders, resulting in a joint responsibility for management of these aquifers. The seven aquifers that have been identified as important transboundary aquifers (TBA) are tabled below<sup>(1)</sup>. These aquifers consist of all four types of aquifers (Intergranular, Fractured, Combined & Karst). 50% of the border aquifers yield is <0.5 l/s. The median yield of more than half of SAs Transboundary aquifers is <0.5 l/s.

No.	Aquifer Name	Countries
25.	Limpopo Basin	Mozambique, Swaziland, South Africa
26.	Coastal Sedimentary Basin	Namibia, South Africa
33.	SE Kalahari/Karoo Basin	Botswana, Namibia, South Africa
34.	Ramotswa Dolomite Basin	Botswana, South Africa
36.	Tuli Karoo Sub-basin	Botswana, South Africa, Zimbabwe
37.	Medum Zambezi Aquifer	Botswana, Mozambique, South Africa, Zimbabwe
38.	Karoo Sedimentary Aquifer	Lesotho, South Africa

Table 5-1 Managing shared aquifer resources in Africa. (ISARM - Africa (2000))



Transboundary Aquifers on the border of RSA

(1) See Appelgren (2004)

# National Development Plan 2030

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- Key proposals in the agriculture and agro-processing sectors include:
- Substantial investment in irrigation infrastructure, including water storage, distribution and reticulation throughout the country where the natural resource base allows, as well as in water-saving technology. A 50 percent increase in land under irrigation would cost R40 billion in off-farm infrastructure over a 10-year period.

# National Development Plan 2030

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- As the primary economic activity in rural areas, agriculture has the potential to create close to 1 million new jobs by 2030, a significant contribution to the overall employment target. To achieve this, South Africa needs to:
- Expand irrigated agriculture. Evidence shows that the 1.5 million hectares under irrigation (which produce virtually all South Africa's horticultural harvest and some field crops) can be expanded by at least 500 000 hectares through the better use of existing water resources and developing new water schemes.



# Threats

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- Acid Mine Drainage
- Untreated sewage
- Hydraulic fracturing

# Conclusions

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- More research needed on aquifers
- Increased use of groundwater
- Vital to protect groundwater against threats
- Consider carefully suitability of water use