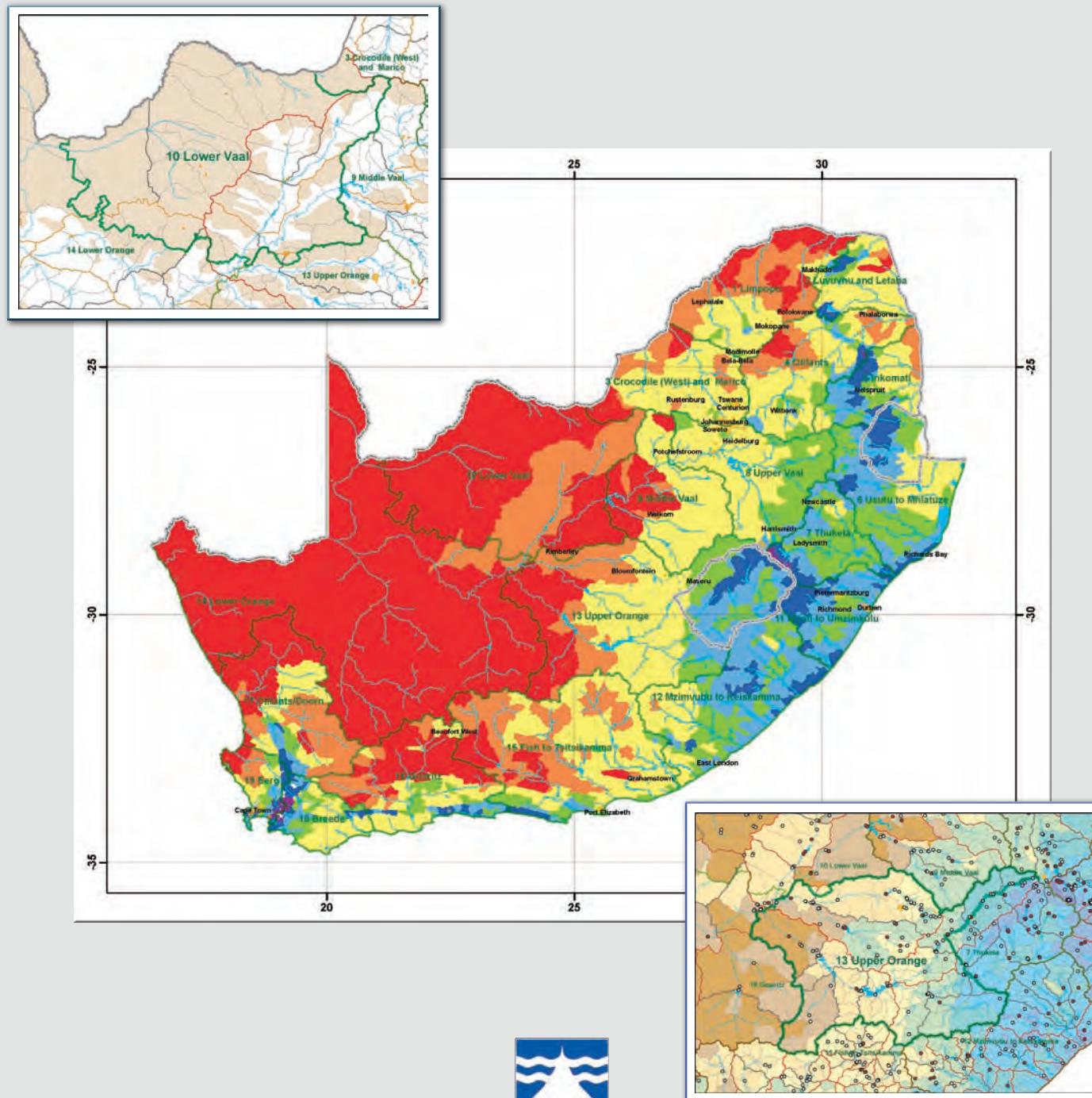


# WATER RESOURCES OF SOUTH AFRICA, 2005 STUDY (WR2005)

## BOOK OF MAPS

Version 1

BJ Middleton & AK Bailey



Water Research Commission

# WATER RESOURCES OF SOUTH AFRICA, 2005 STUDY (WR2005)

## BOOK OF MAPS

Version 1: December 2008

by

B J Middleton and A K Bailey

WRC REPORT NUMBER TT 382/08

MARCH 2009

### WR2005 Consortium

SSI, SRK Consulting, Knight Piesold

Arcus Gibb, Ninham Shand, P D Naidoo & Associates, Umfala Wempilo Consulting



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**DISCLAIMER**

This report has been reviewed by the Water Research Commission (WRC) and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the WRC, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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## P R E F A C E

This is one of a series of reports which contain the results of a revised appraisal of the Water Resources of South Africa, undertaken in terms of a contract between the Water Research Commission (WRC) and the WR2005 Consortium.

For the 1981 Water Resources Survey, the 22 main drainage regions of South Africa were assembled under six groups which were dealt with in six corresponding volumes, for each of which there was report in two parts. For the 1990 Study (WR90) the same grouping of the main drainage regions was retained and dealt with again in six volumes, but for each of these the report was in three parts: a User's Manual, which is common to all six volumes, a set of Appendices and a Book of Maps.

In this WR2005 study, there are three main documents:

- **Executive Summary**
- **User's Guide**
- **Book of Maps**

Without the active assistance of officials of the Weather Bureau and the Department of Water Affairs and Forestry in providing access to published and unpublished data, it would not have been possible to undertake this task. Many other organizations and individuals provided information and assistance and the contributions were of tremendous value.

Dr R Dube (WRC project leader) and members of the Reference Group gave valuable direction. Their input is gratefully acknowledged.

The WR2005 Consortium comprised the following consulting firms:

- SSI Engineers and Environmental Consultants (Pty) Ltd (formerly Stewart Scott Inc.)
- SRK Consulting (SA) (Pty) Limited
- Knight Piesold (Pty) Limited
- Arcus Gibb (Pty) Limited
- Ninham Shand (Pty) Limited
- P D Naidoo & Associates Consulting Engineers (Pty) Limited
- Umfula Wempilo Consulting cc

Our sincere thanks go out to all the staff members in these firms who contributed to the project.

**B J Middleton**

**A K Bailey**

WR2005 Consortium



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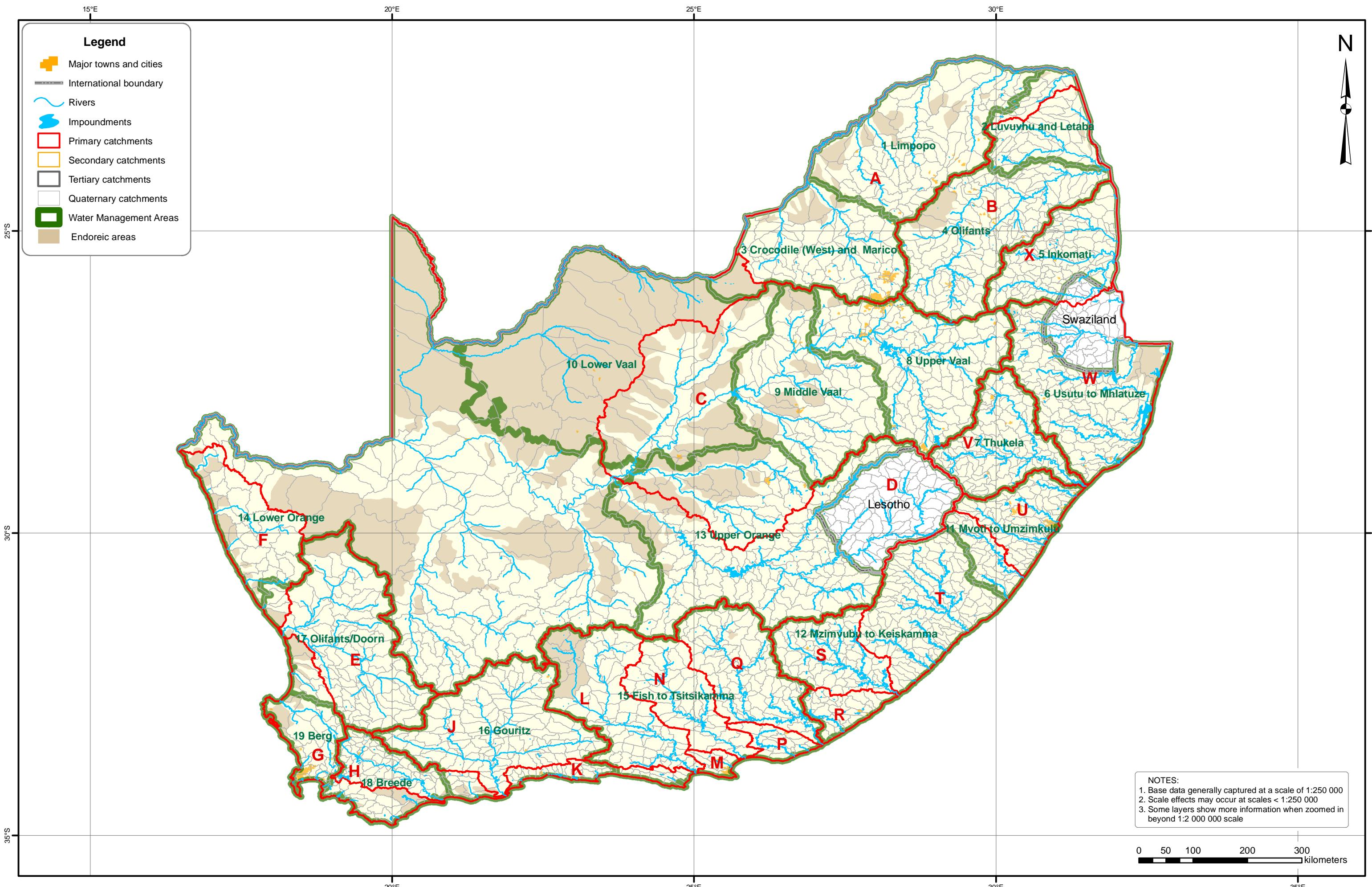
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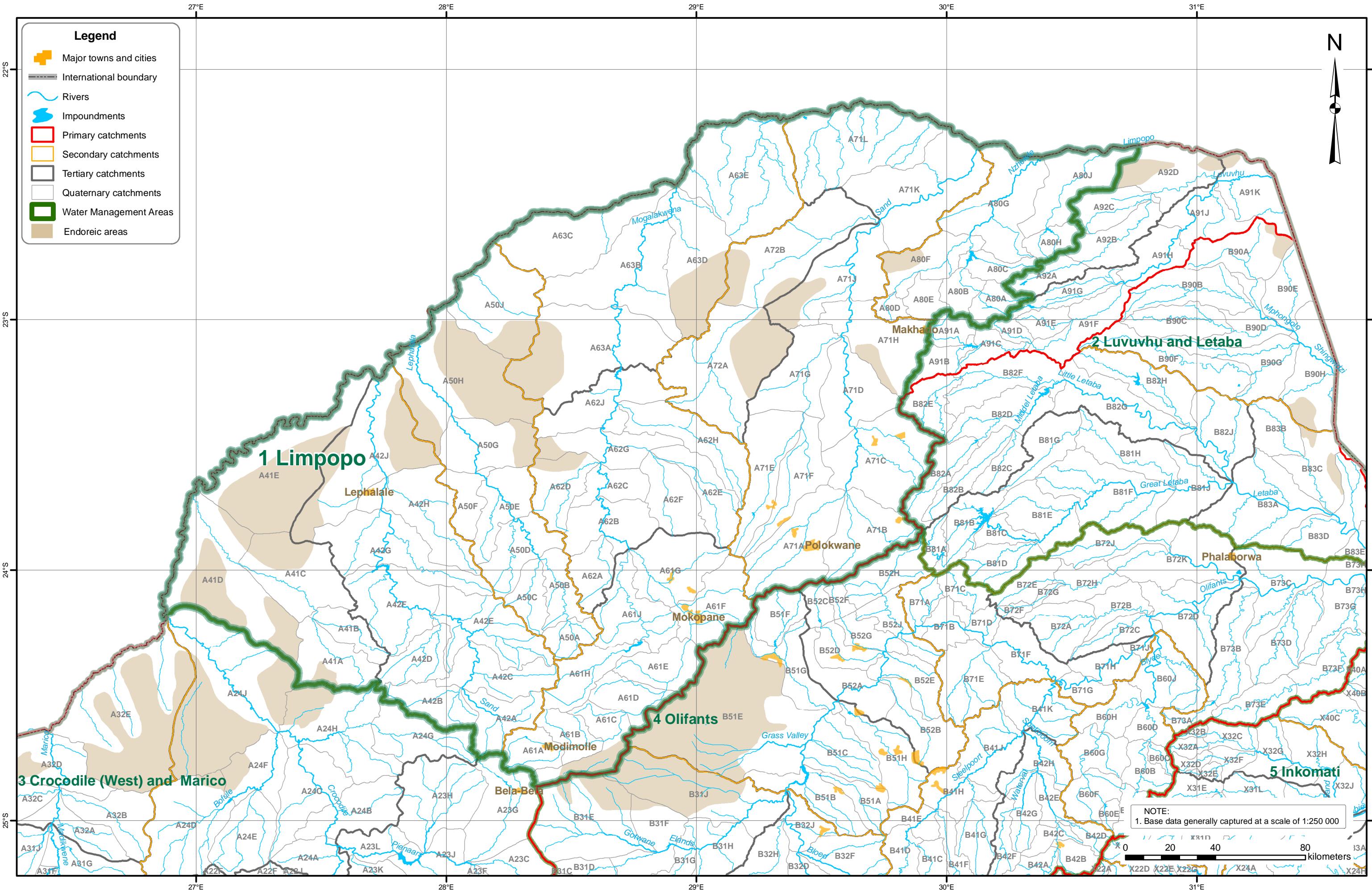
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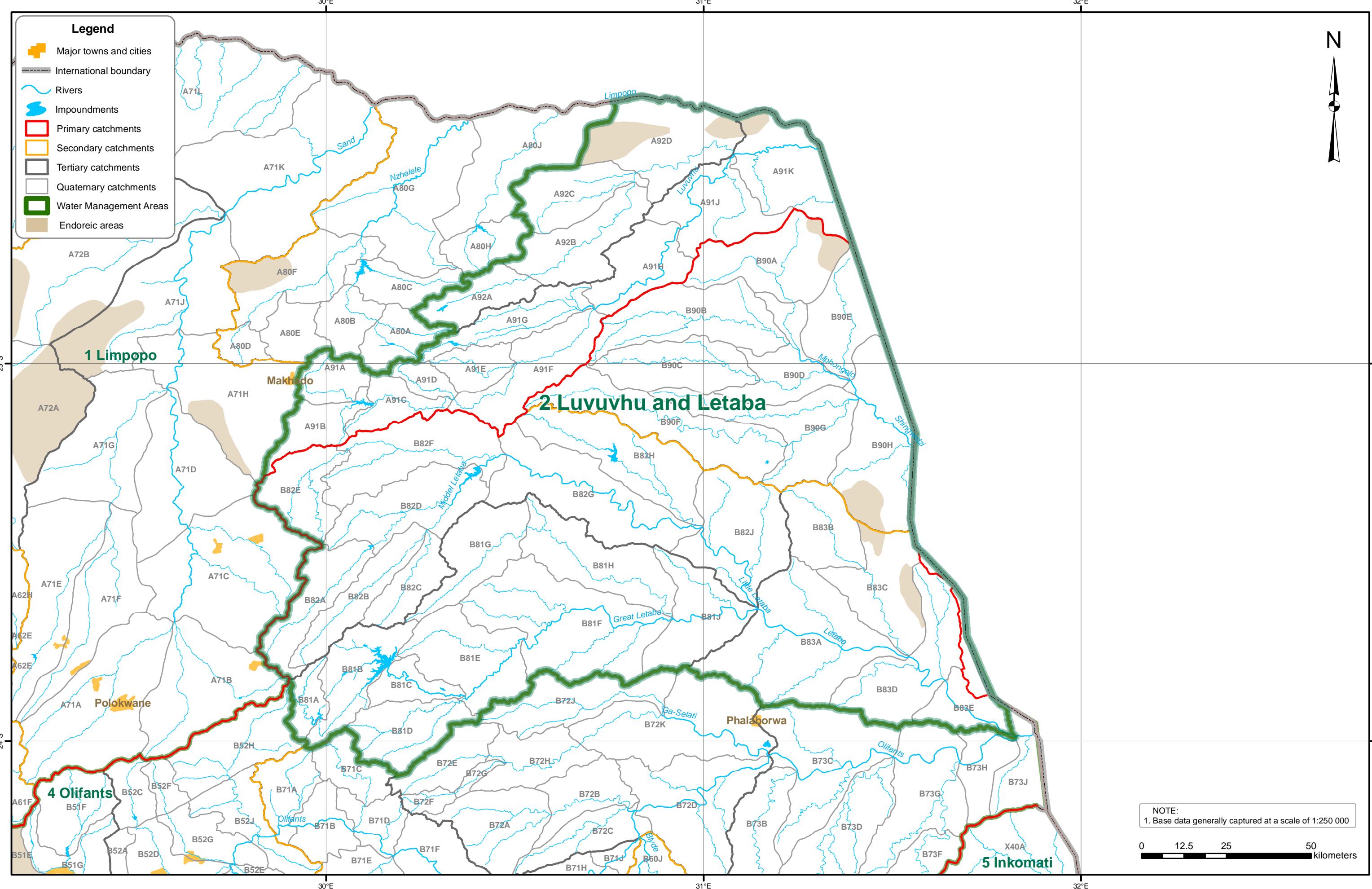
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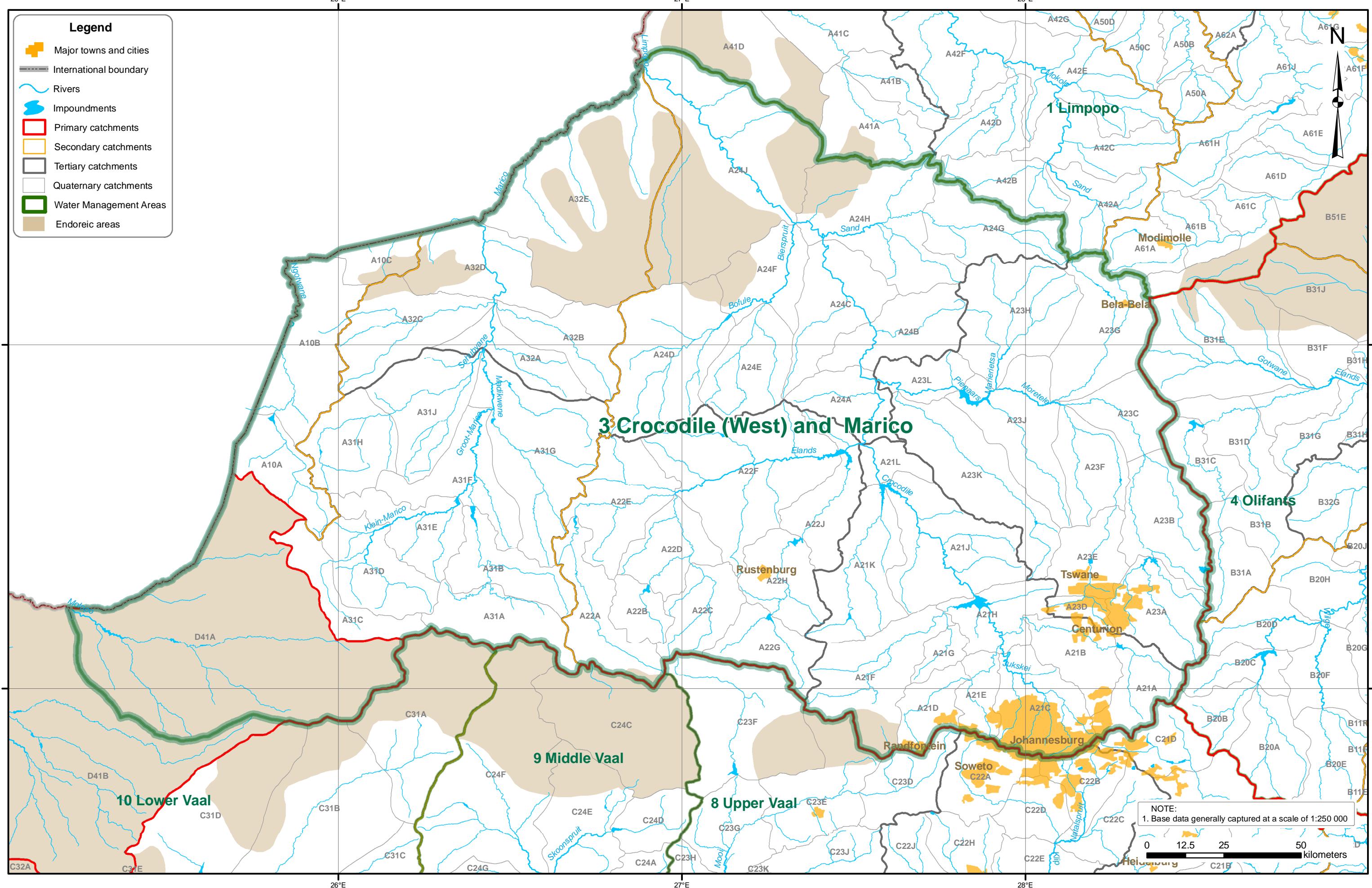
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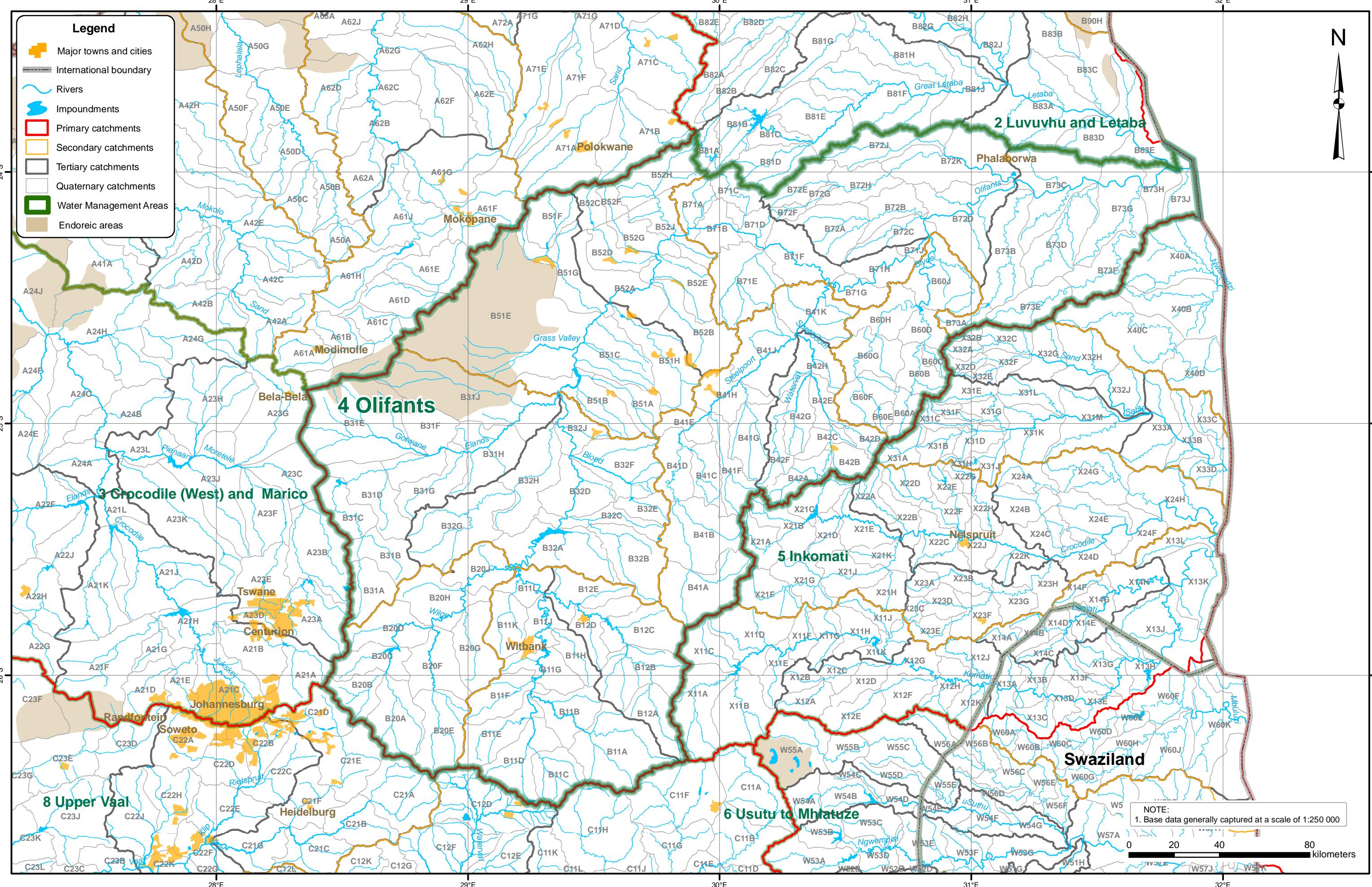


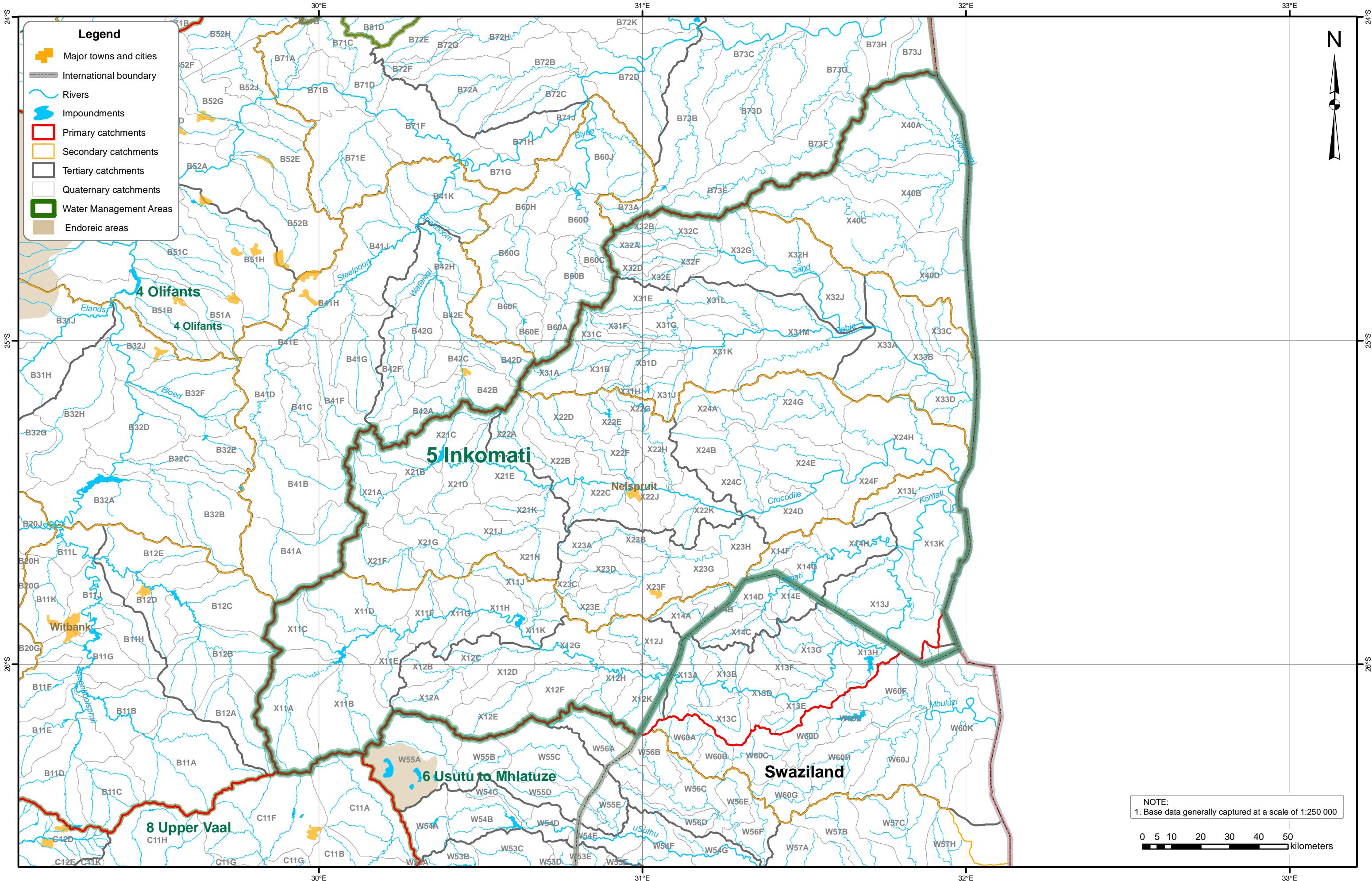


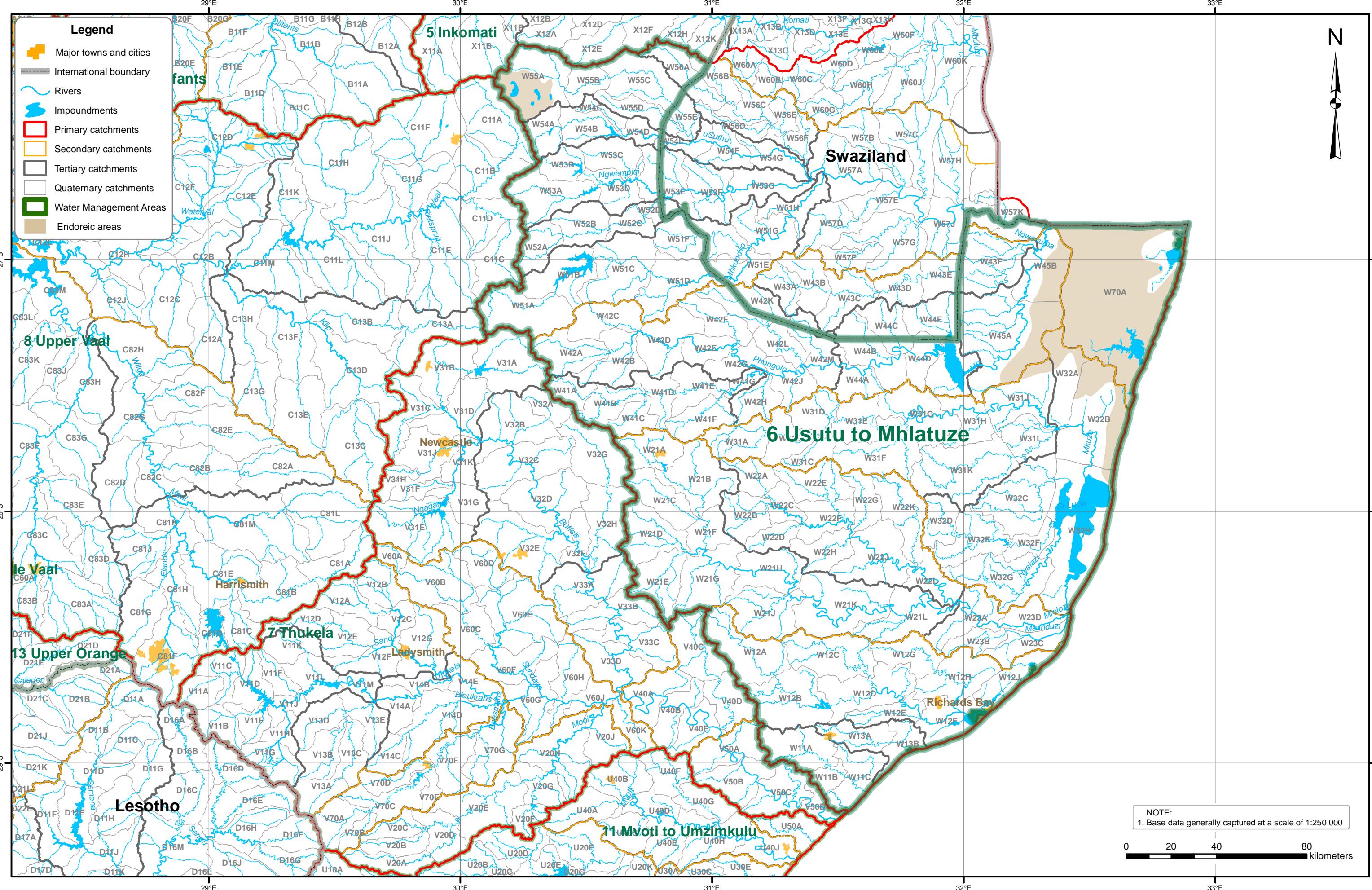


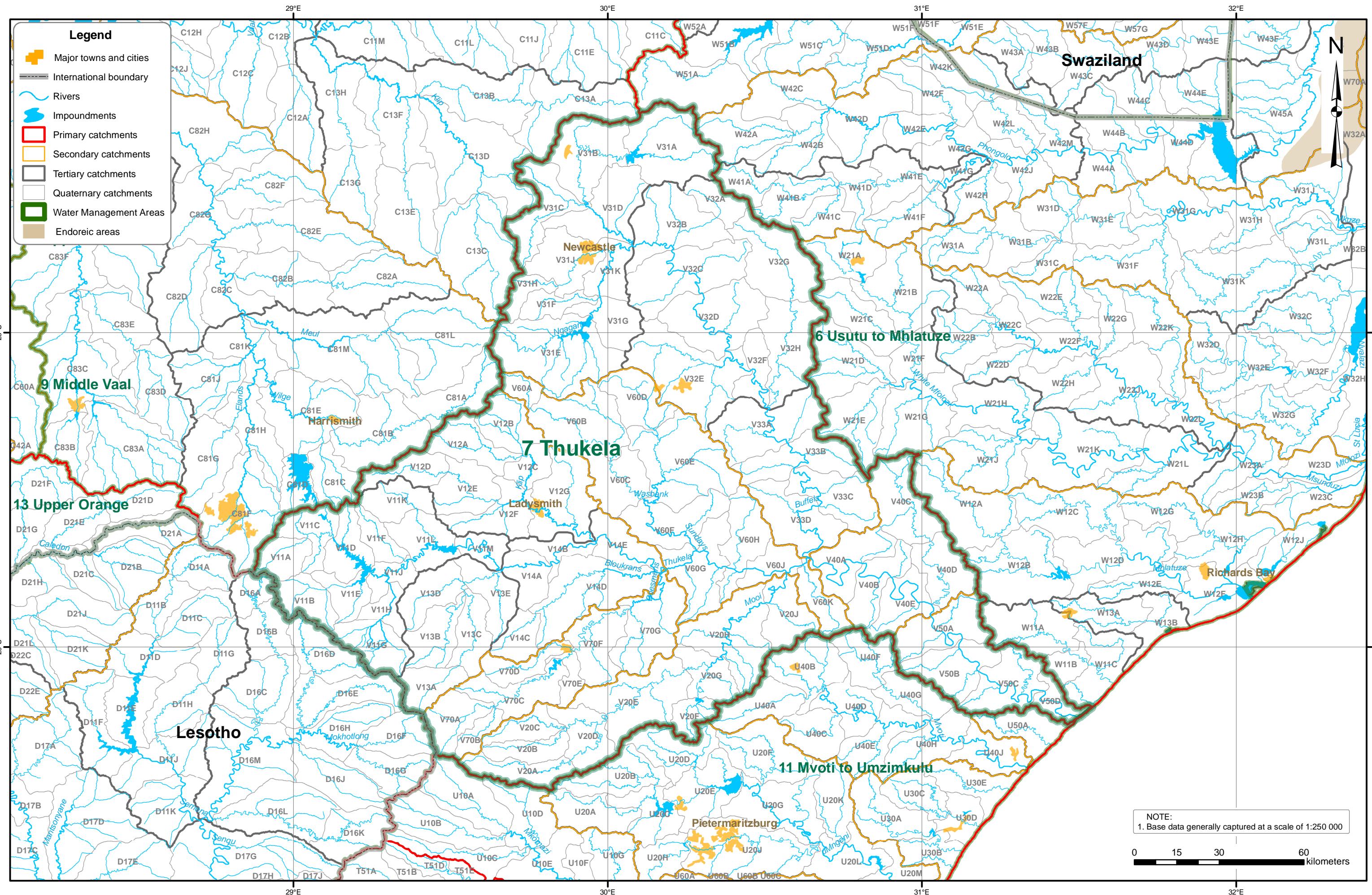


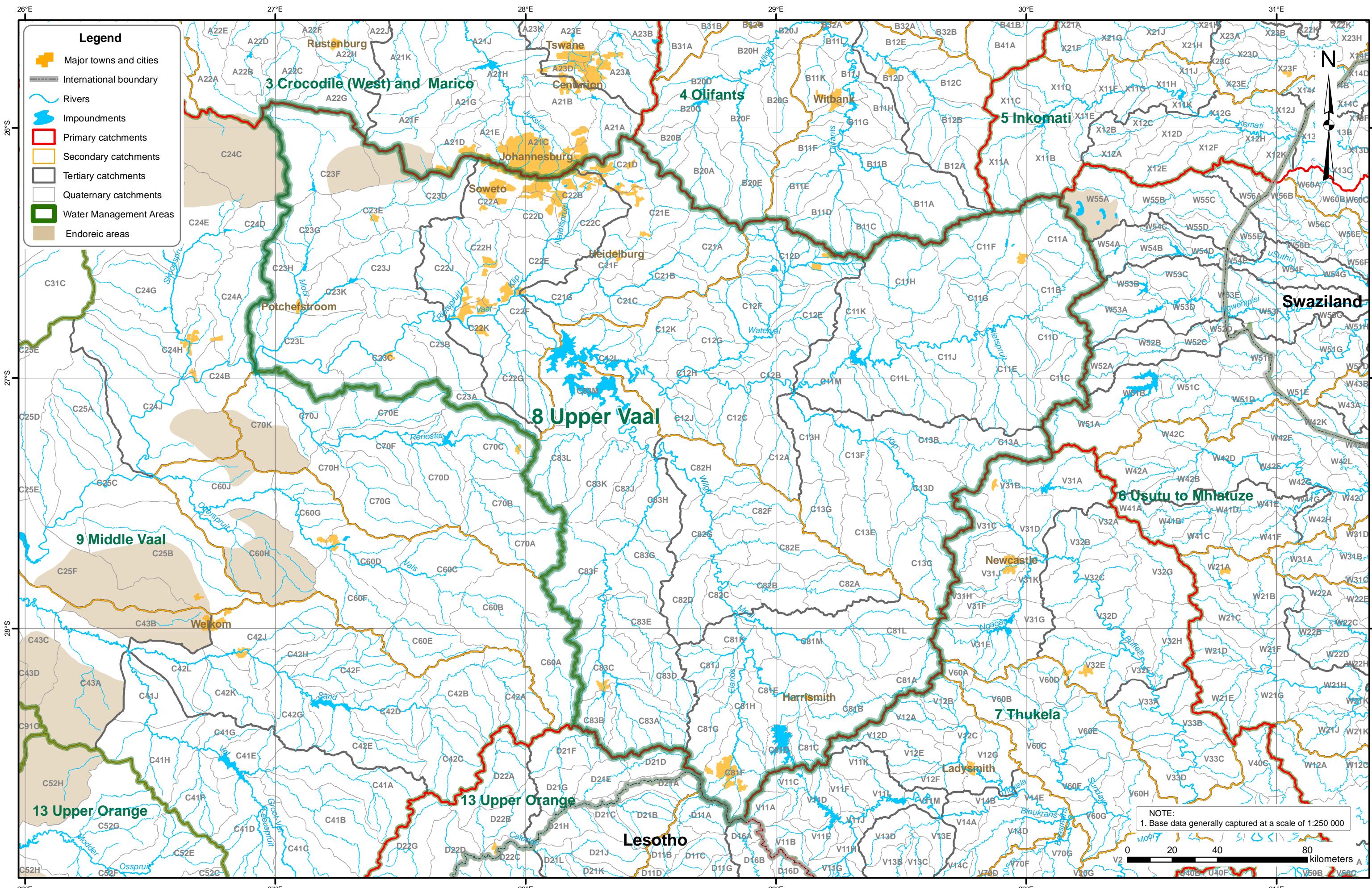


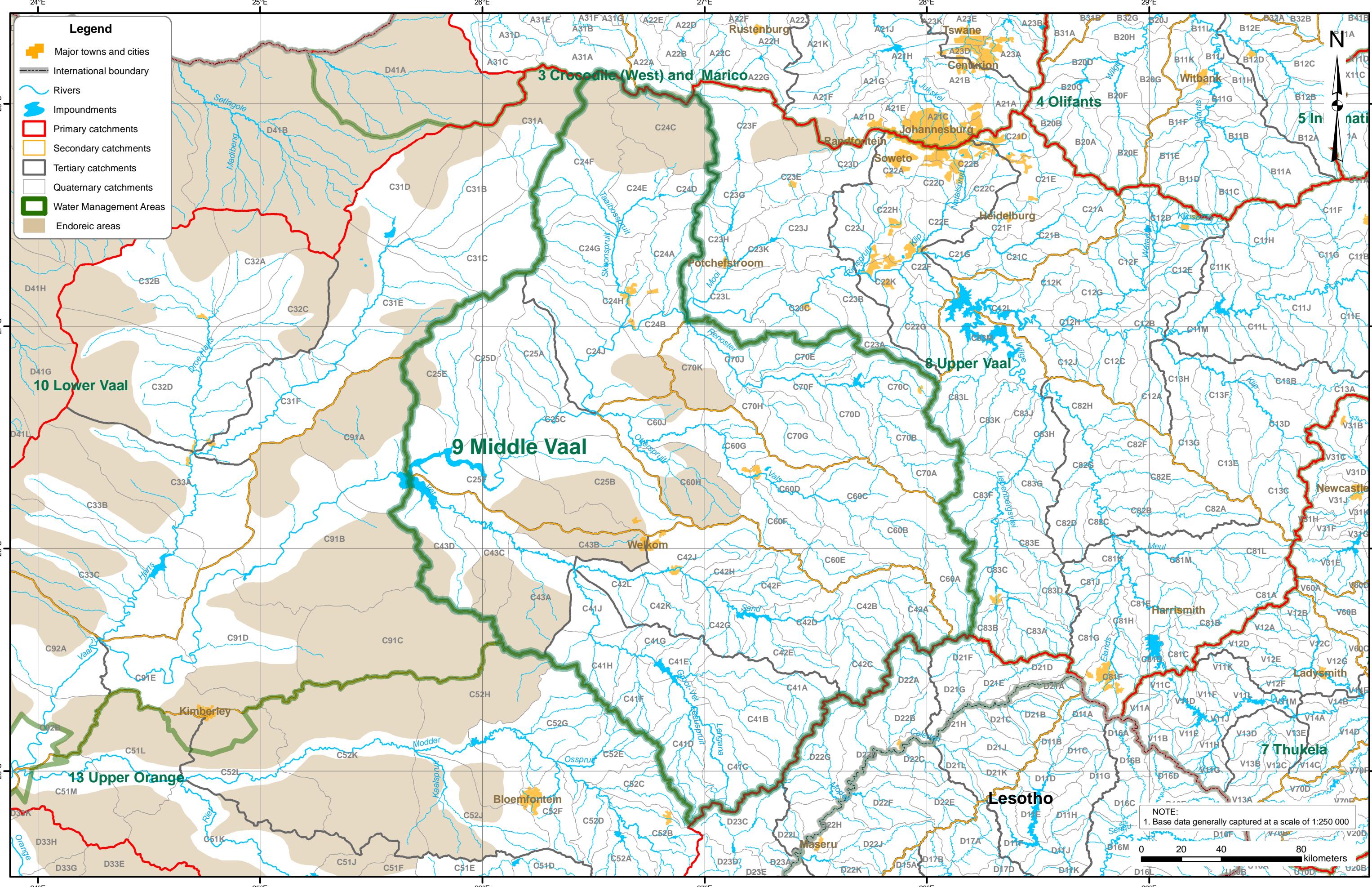


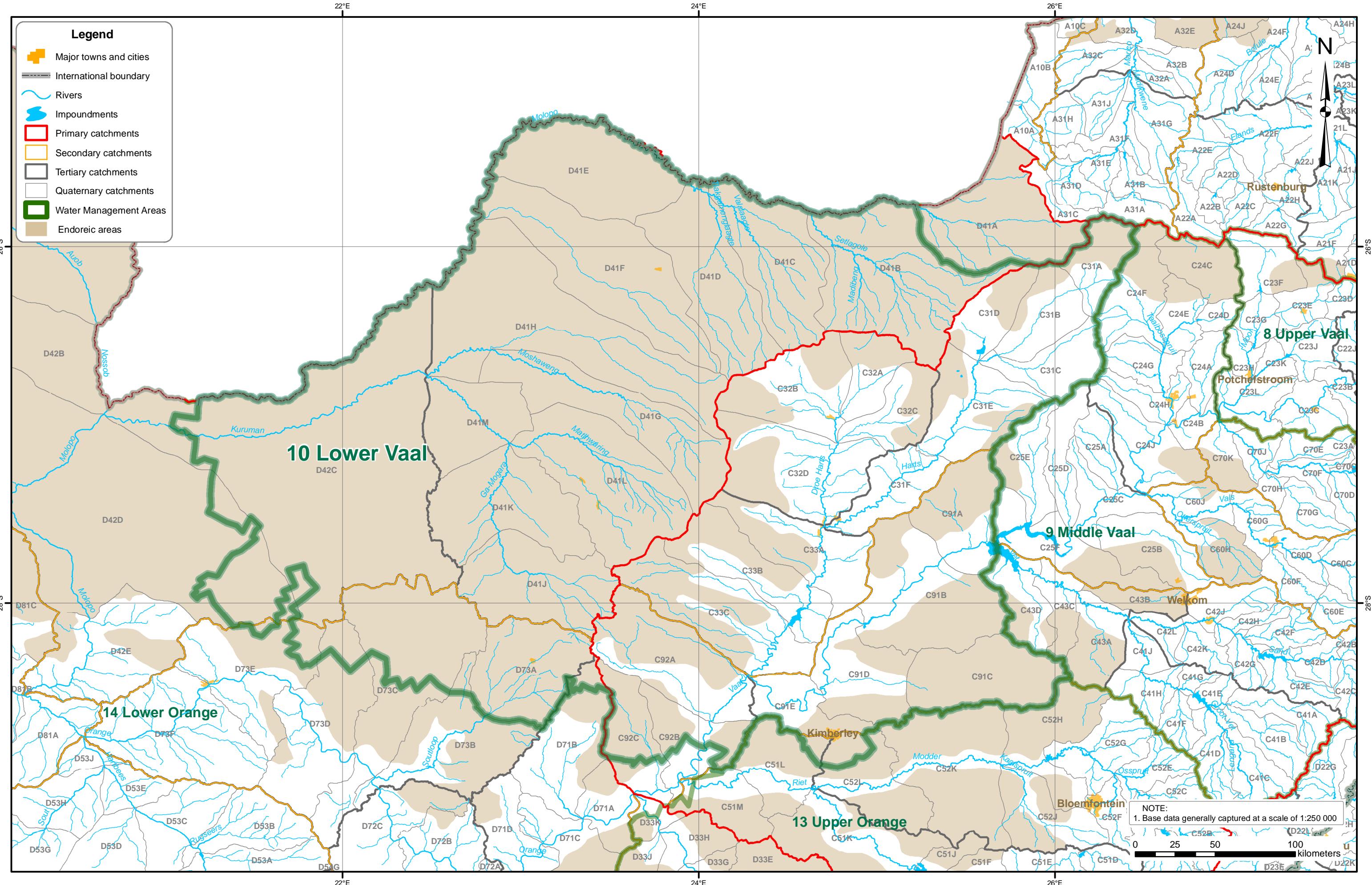


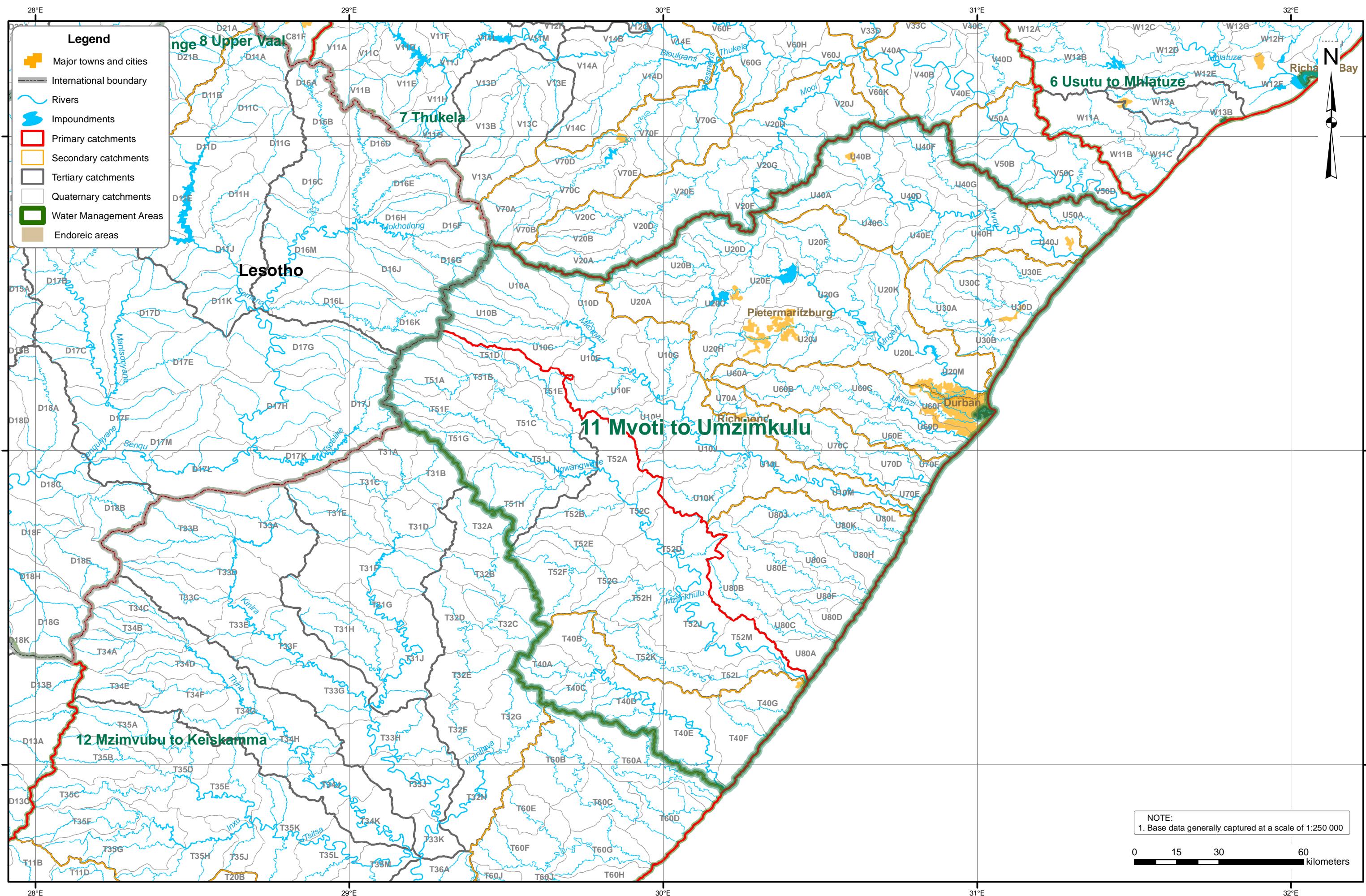


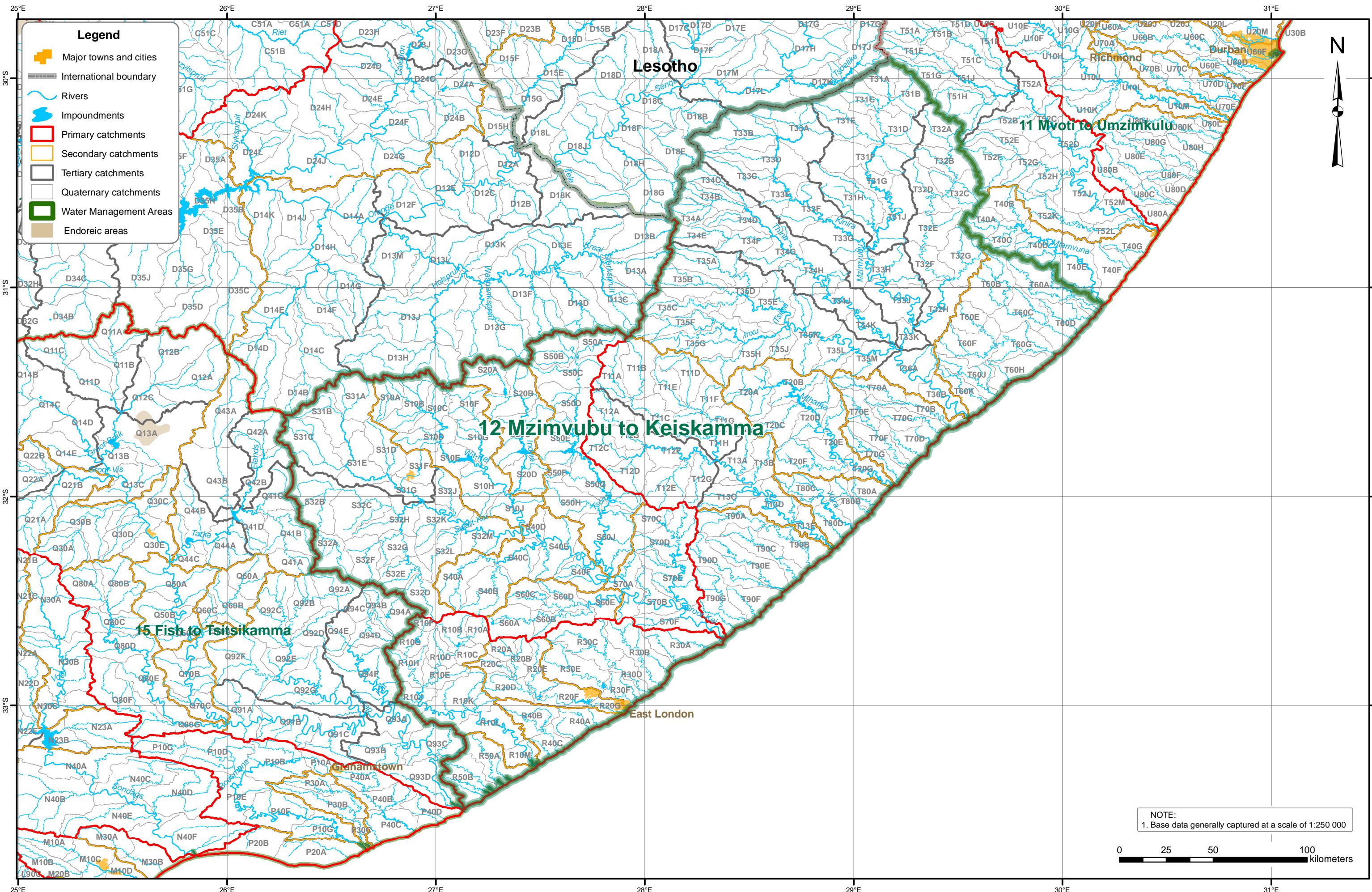


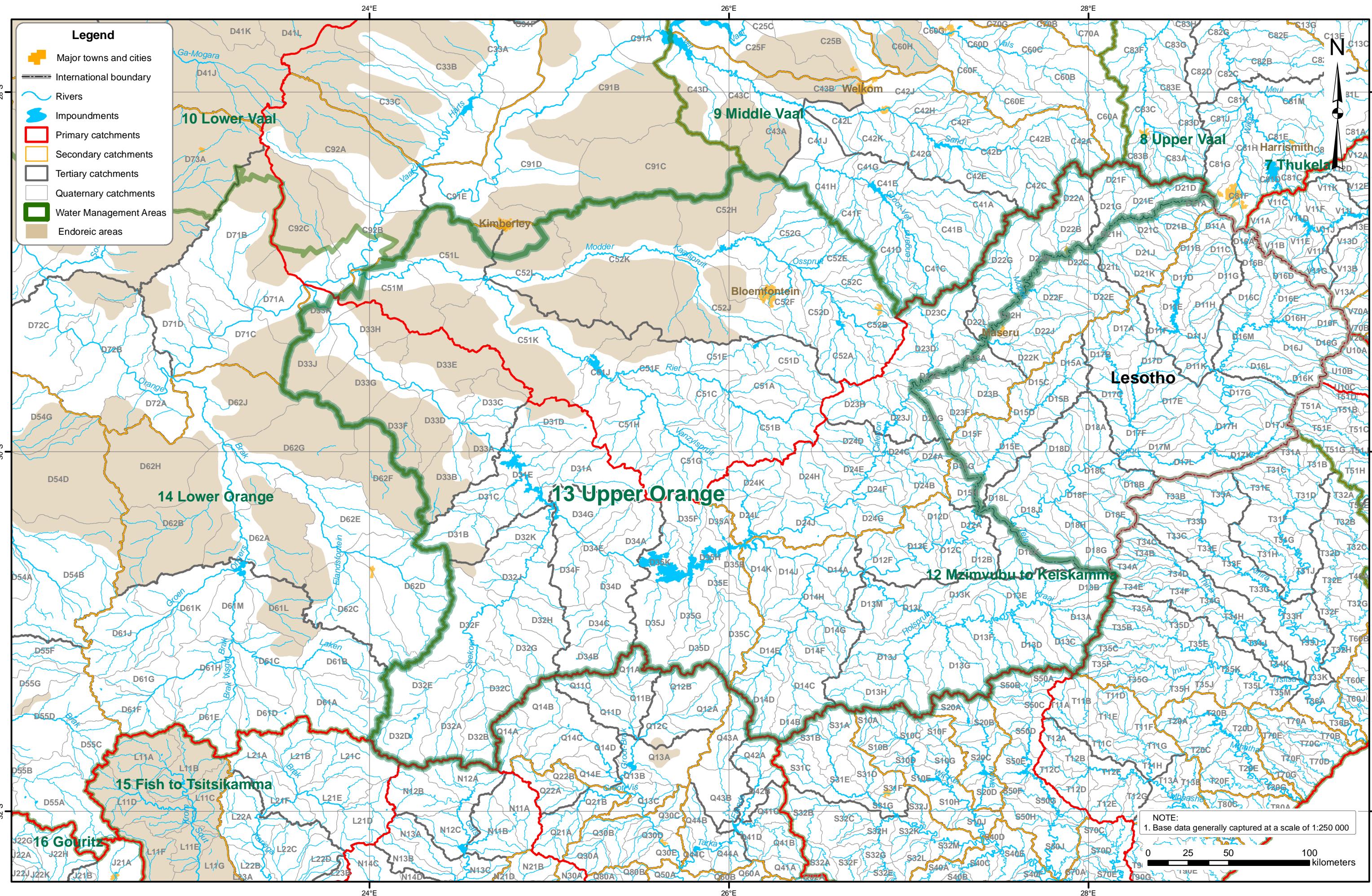


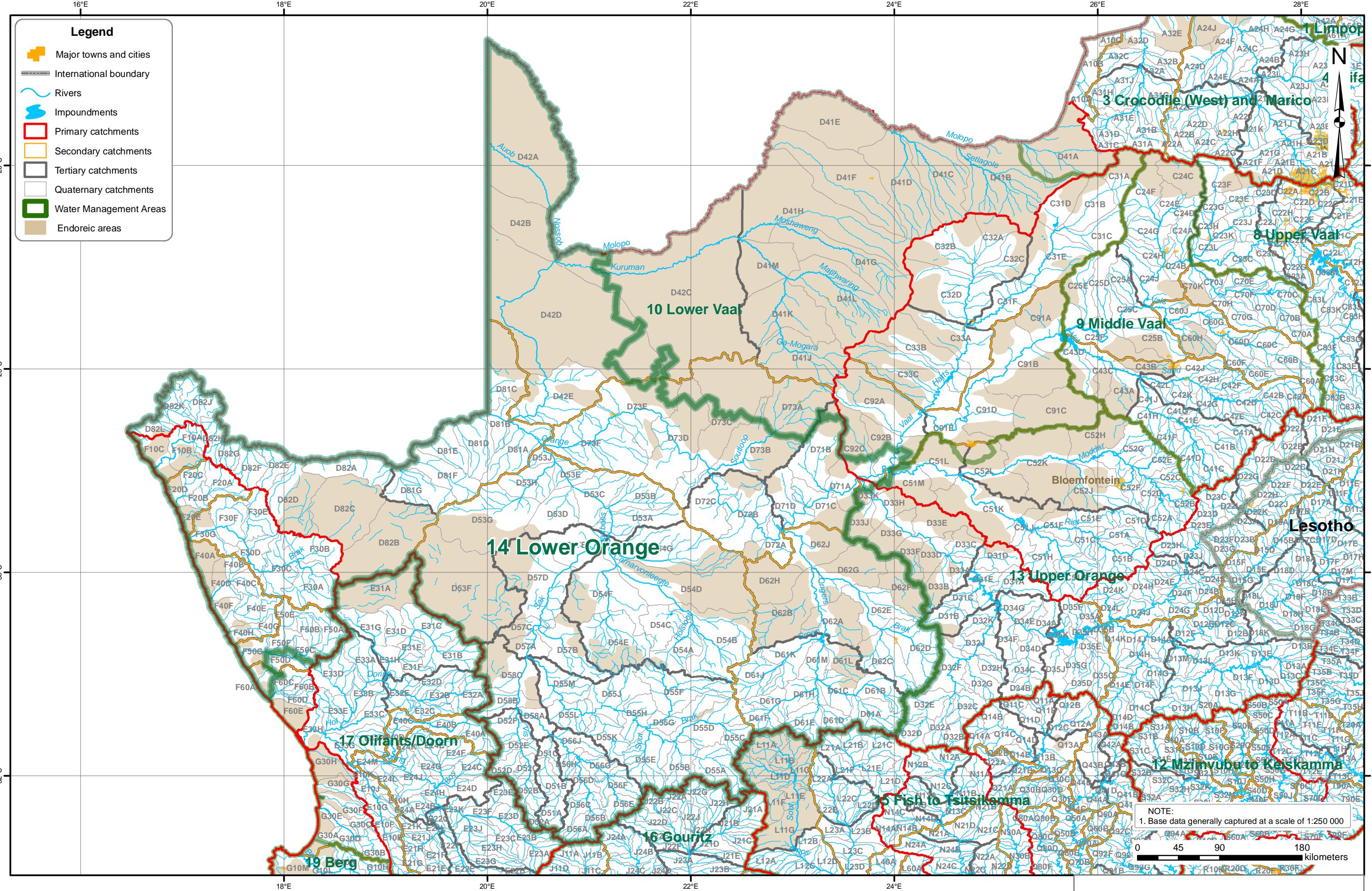


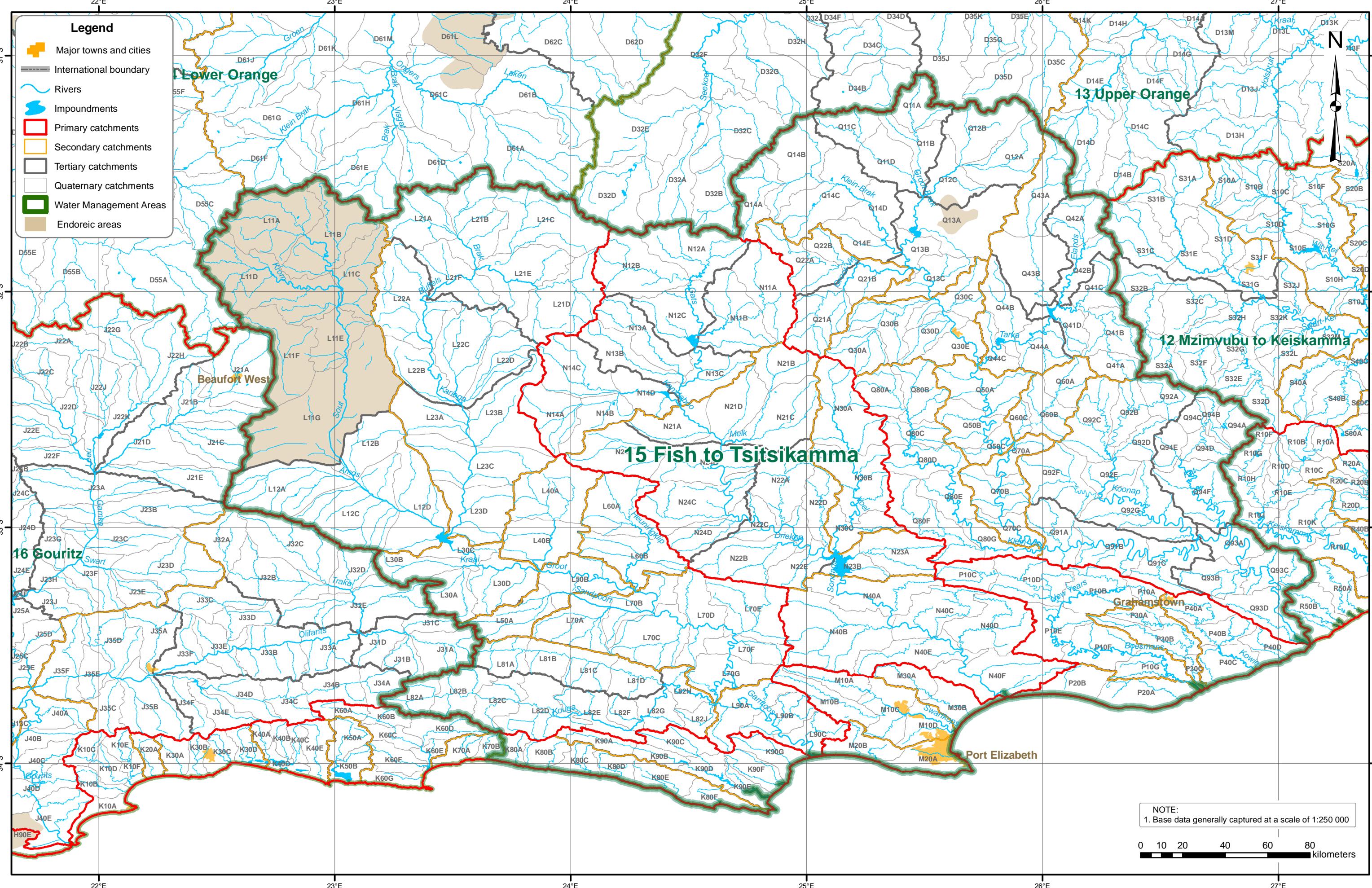


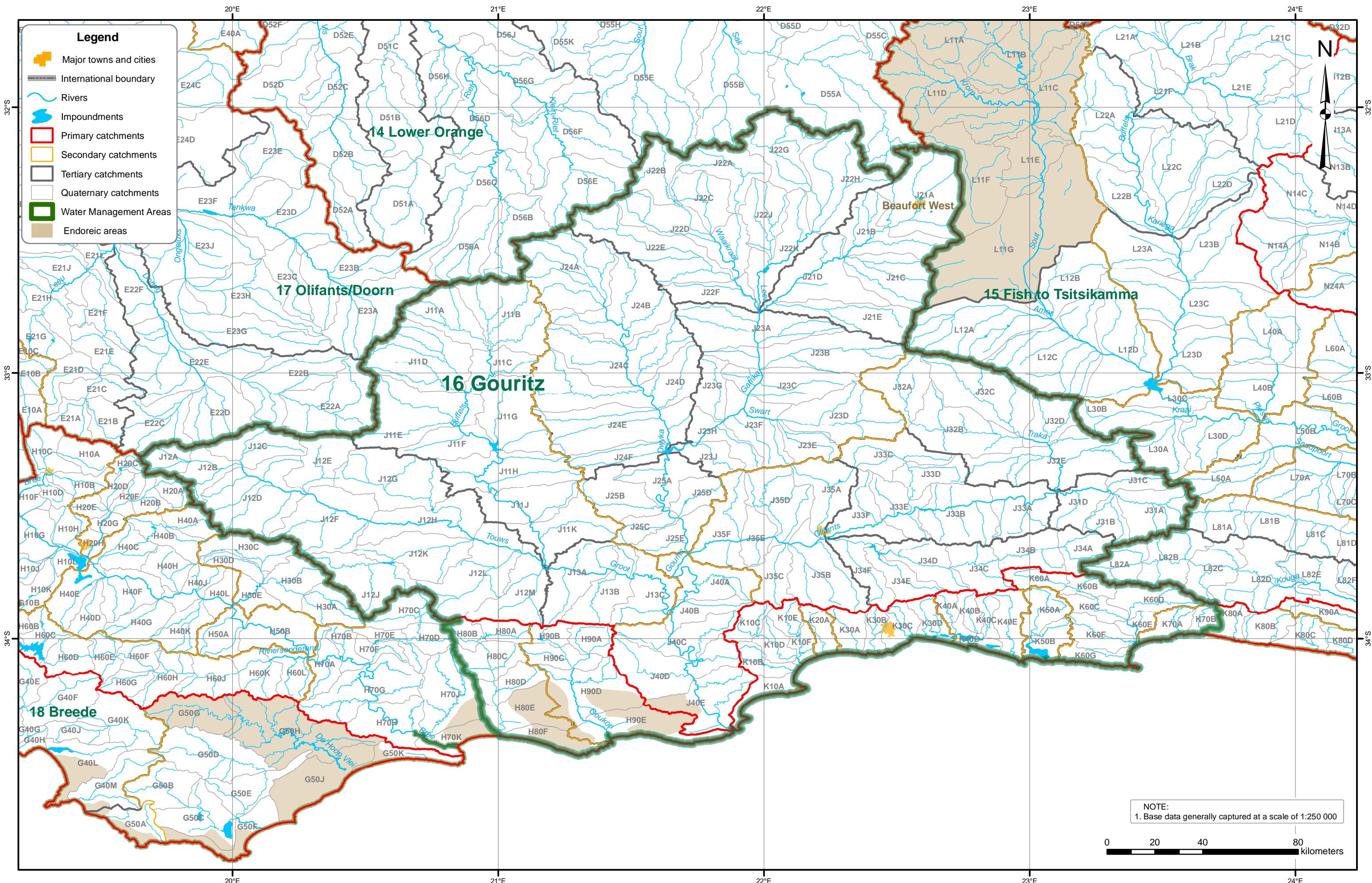




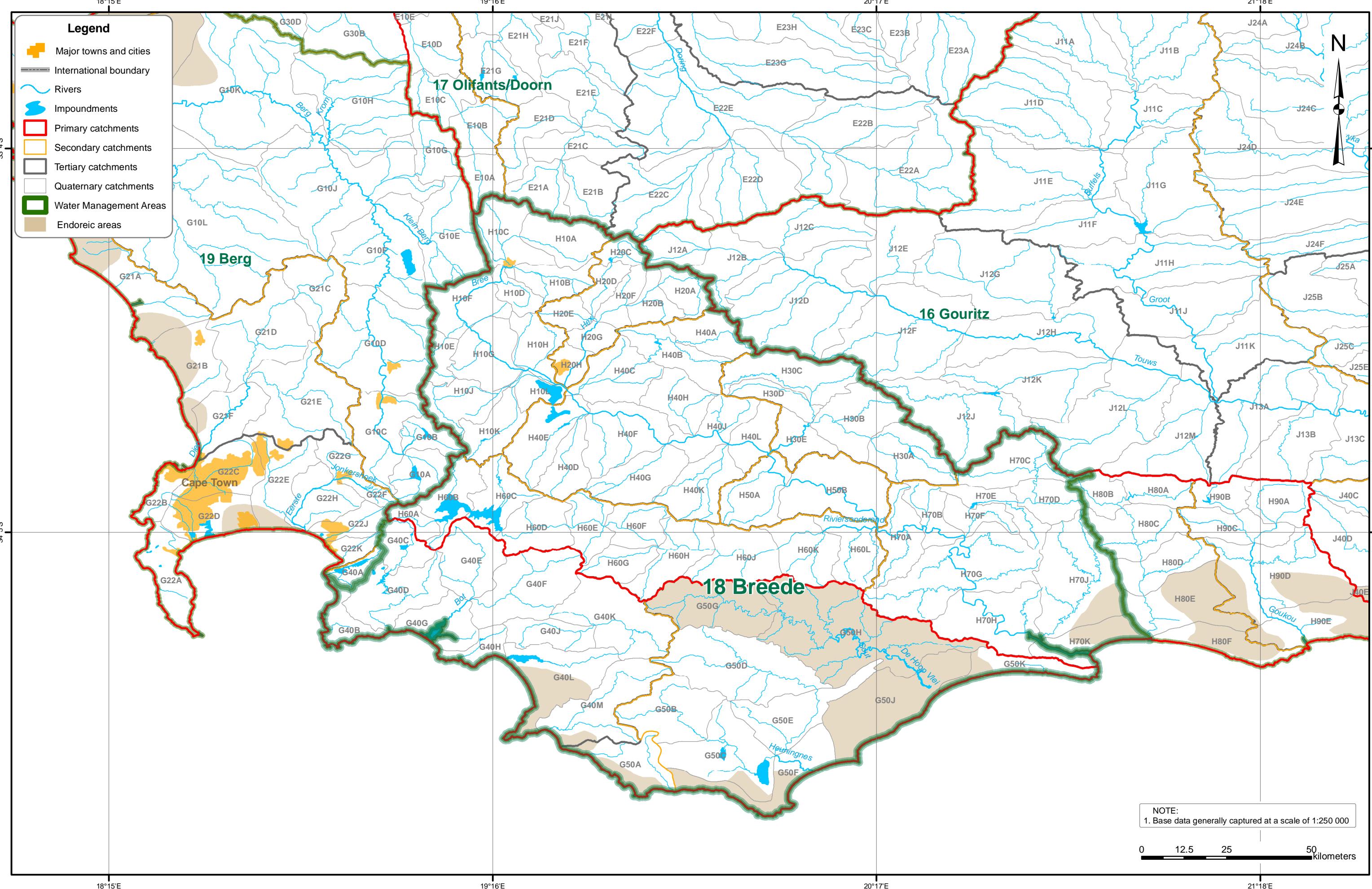


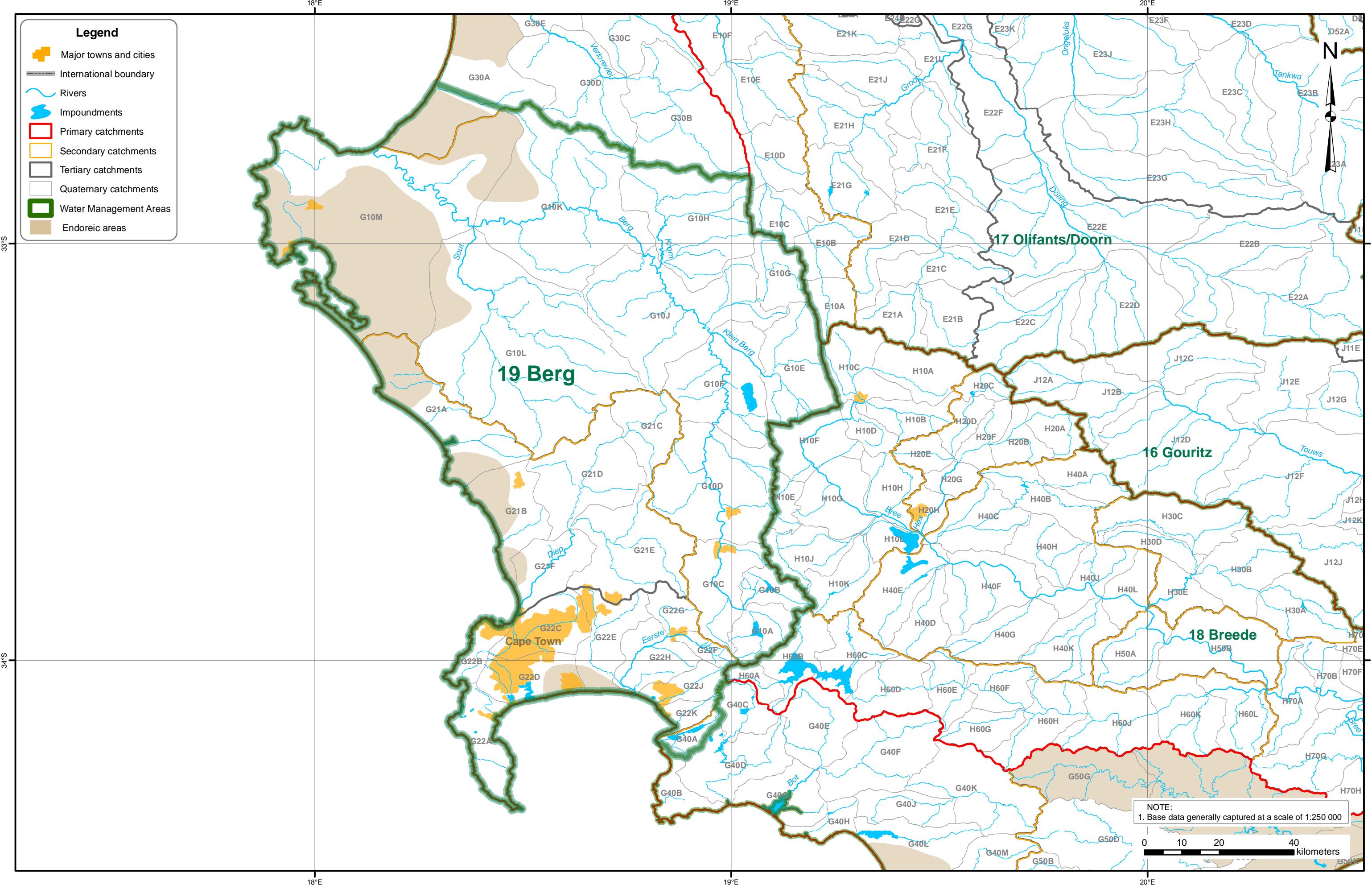


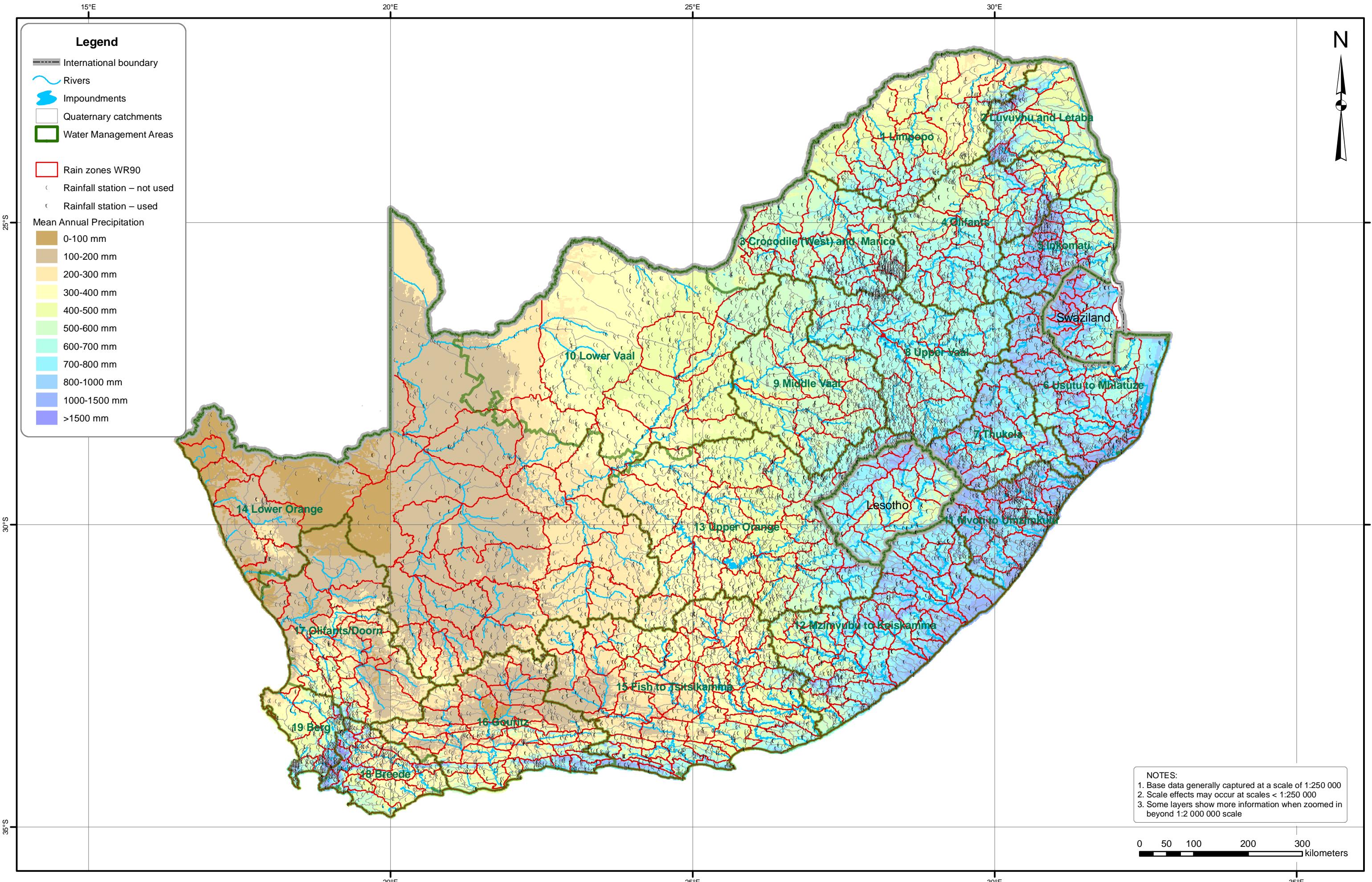


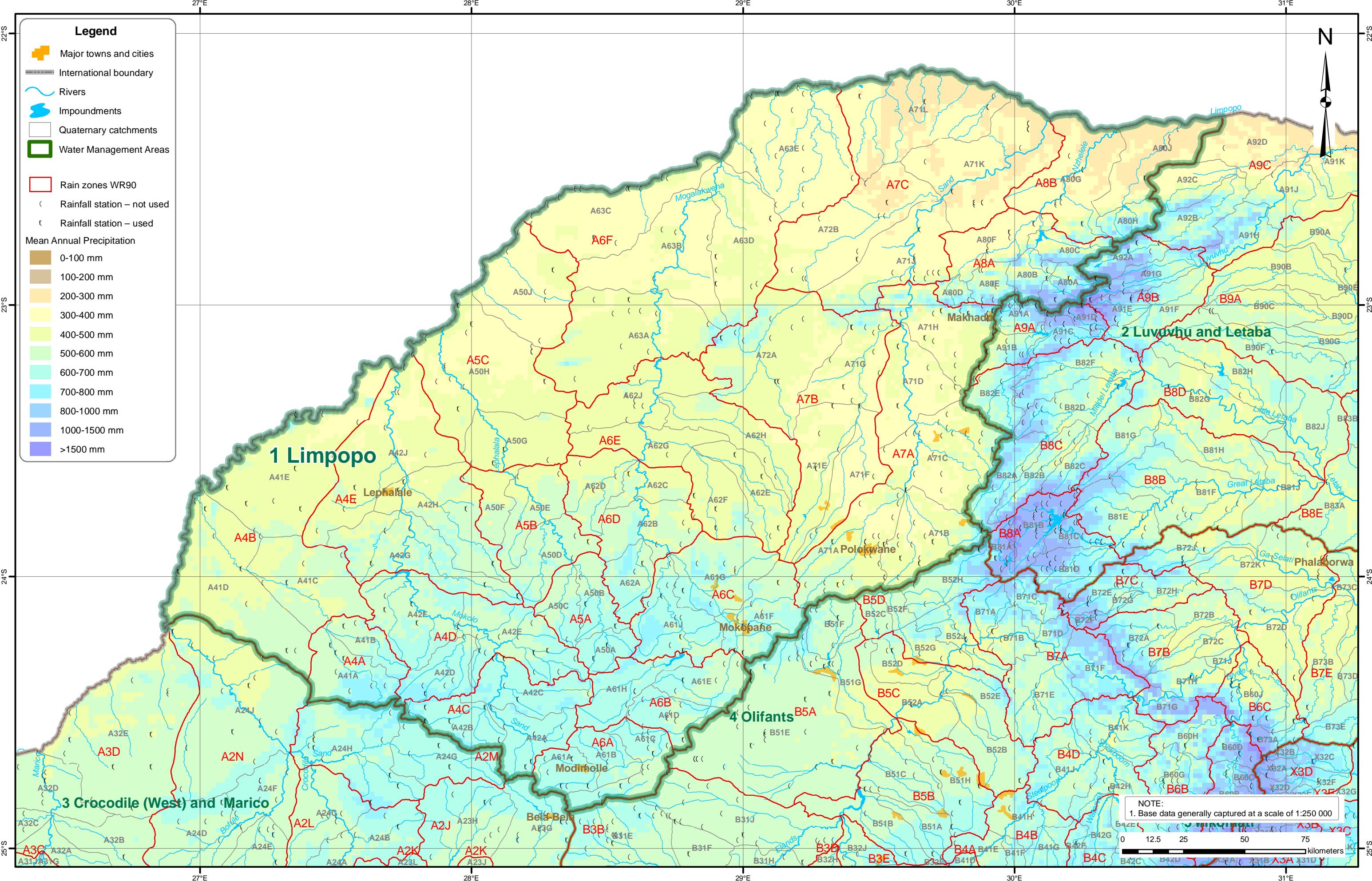


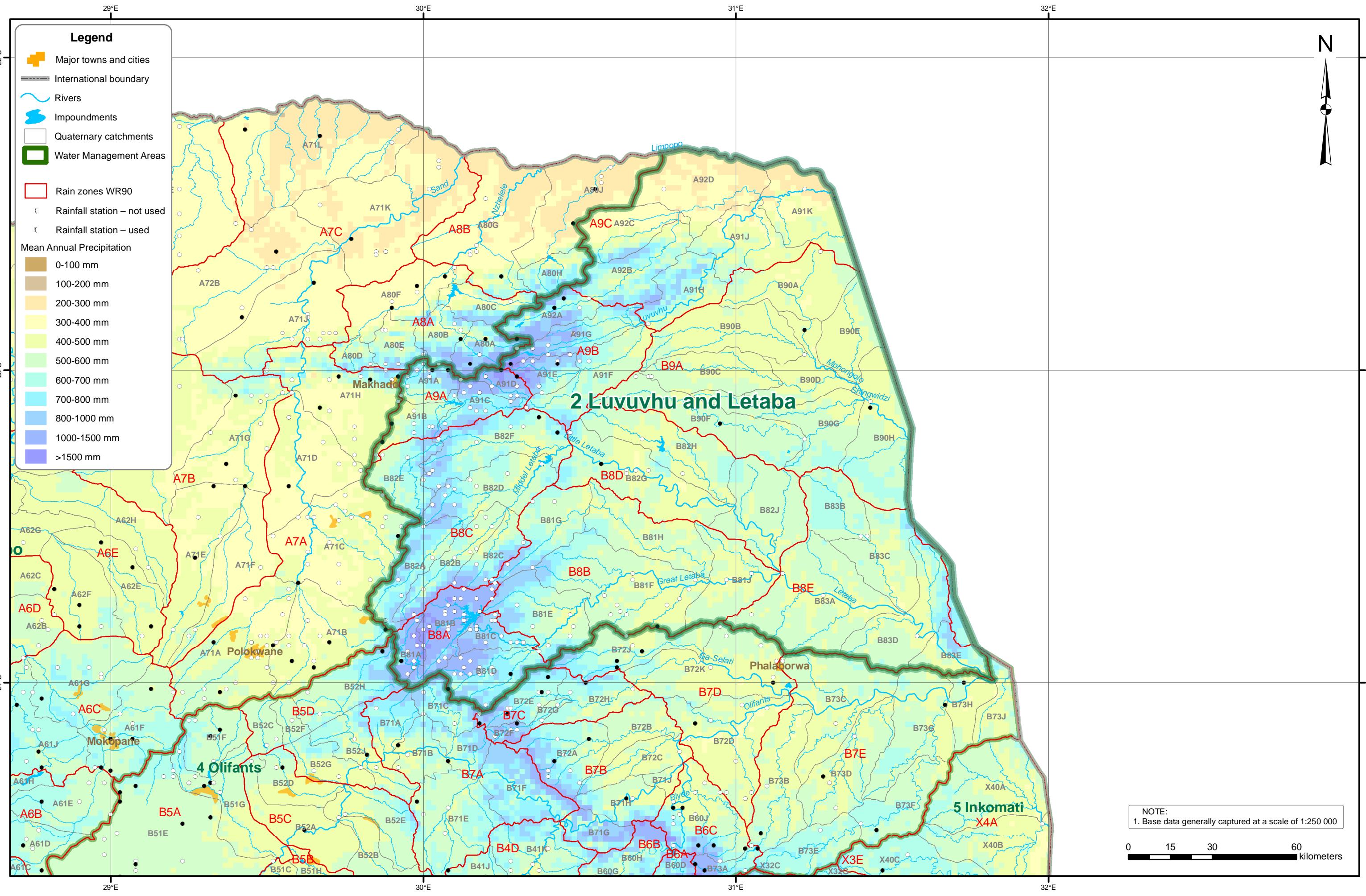


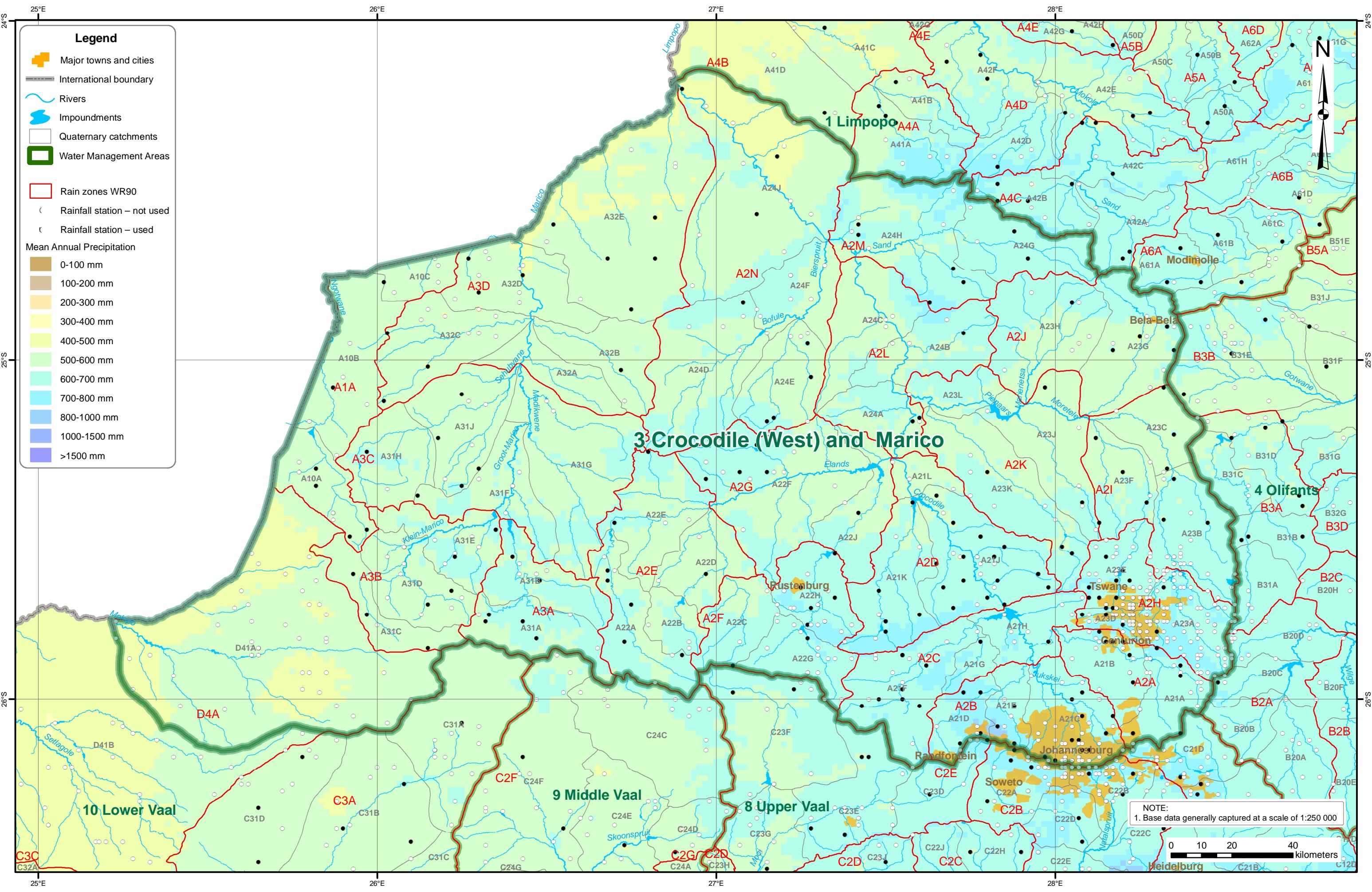


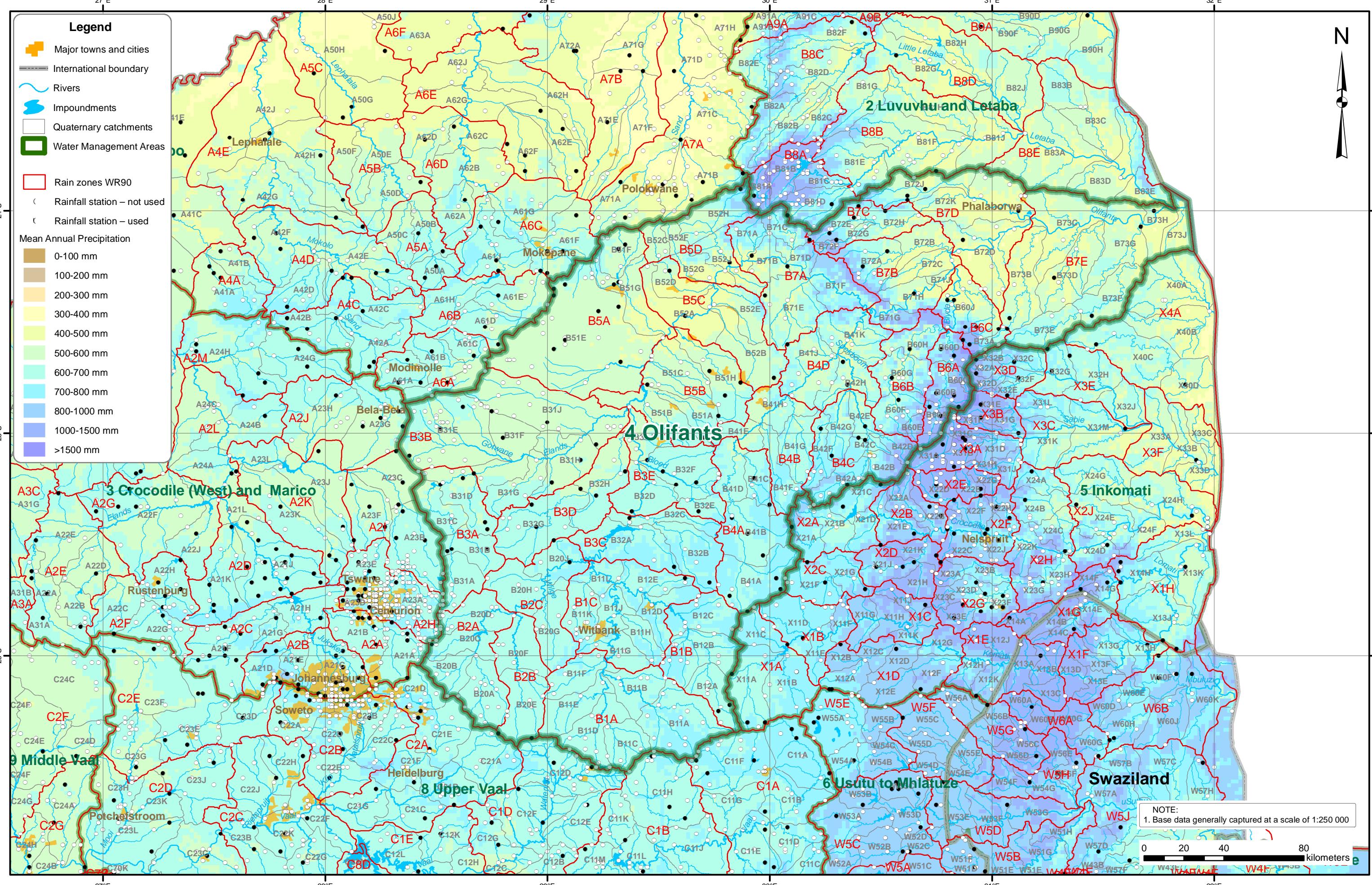


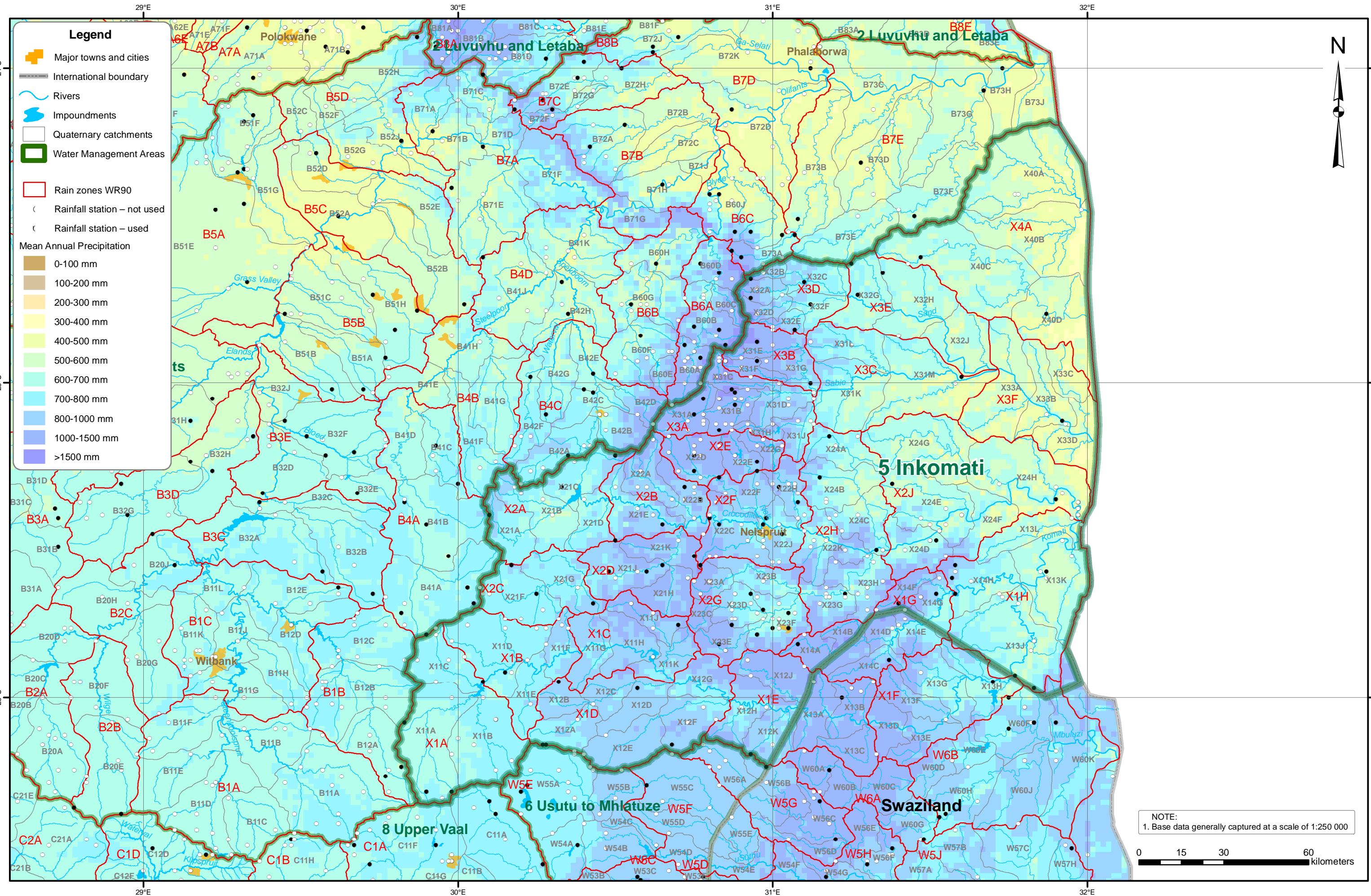


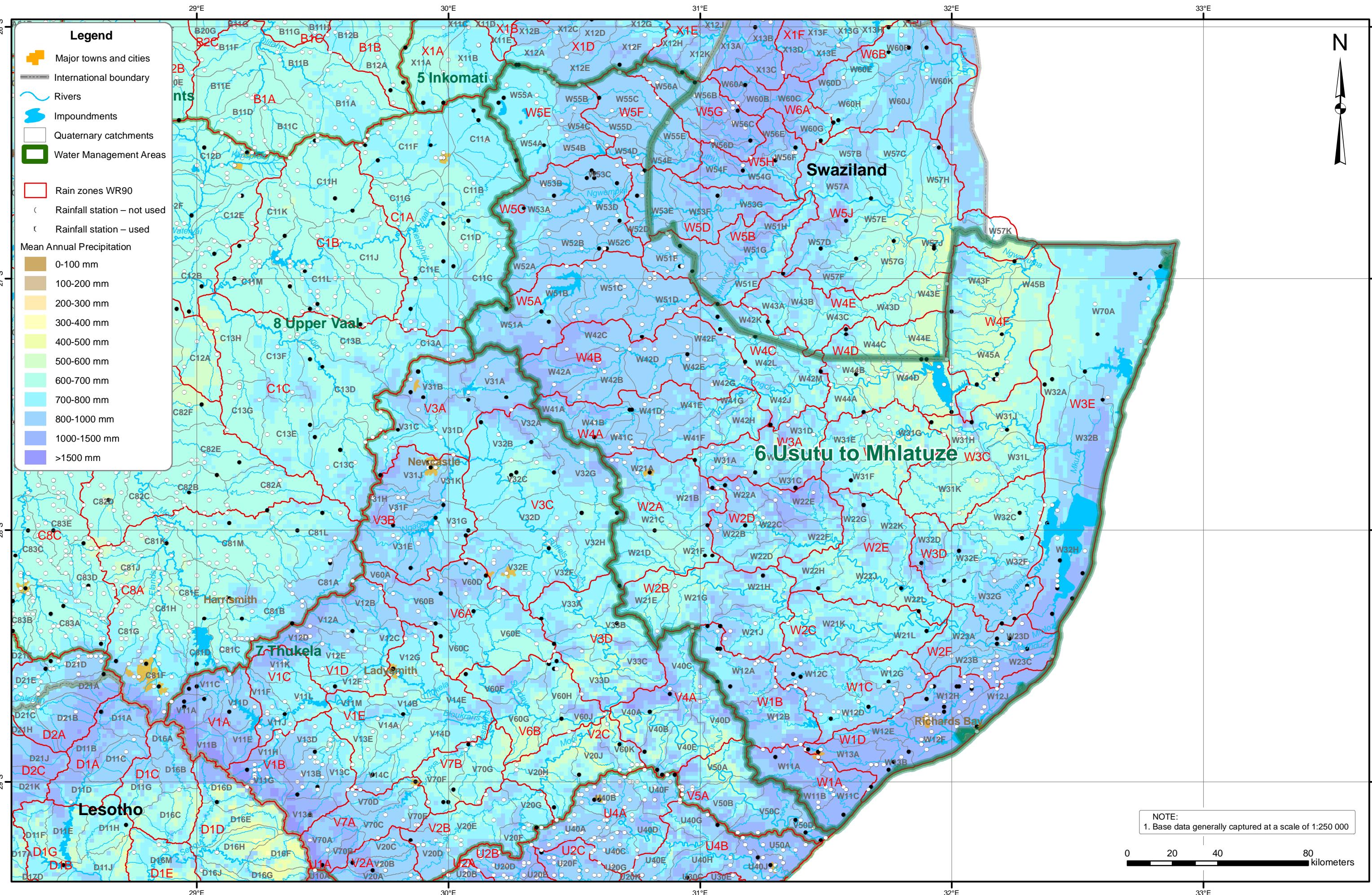


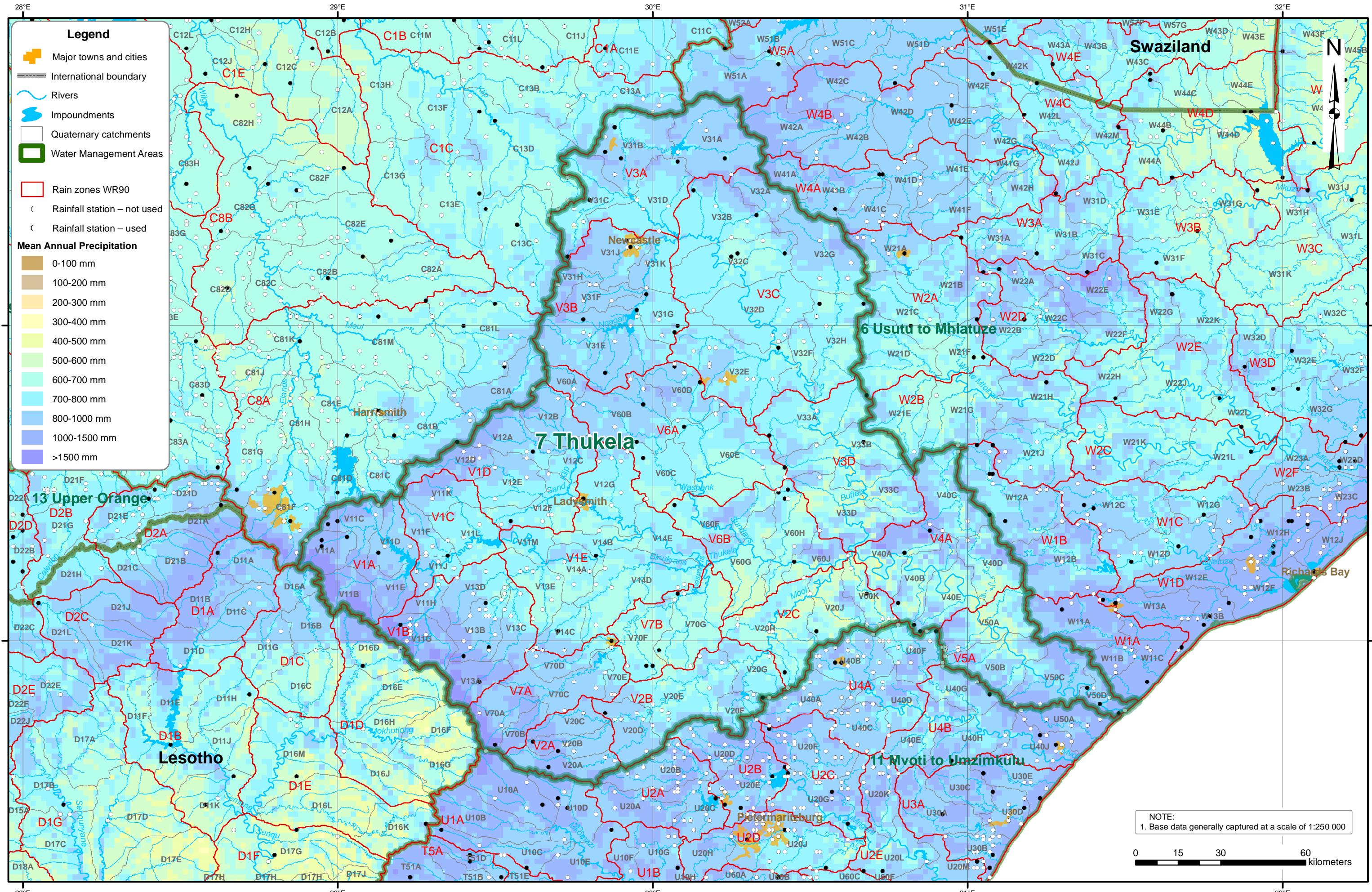


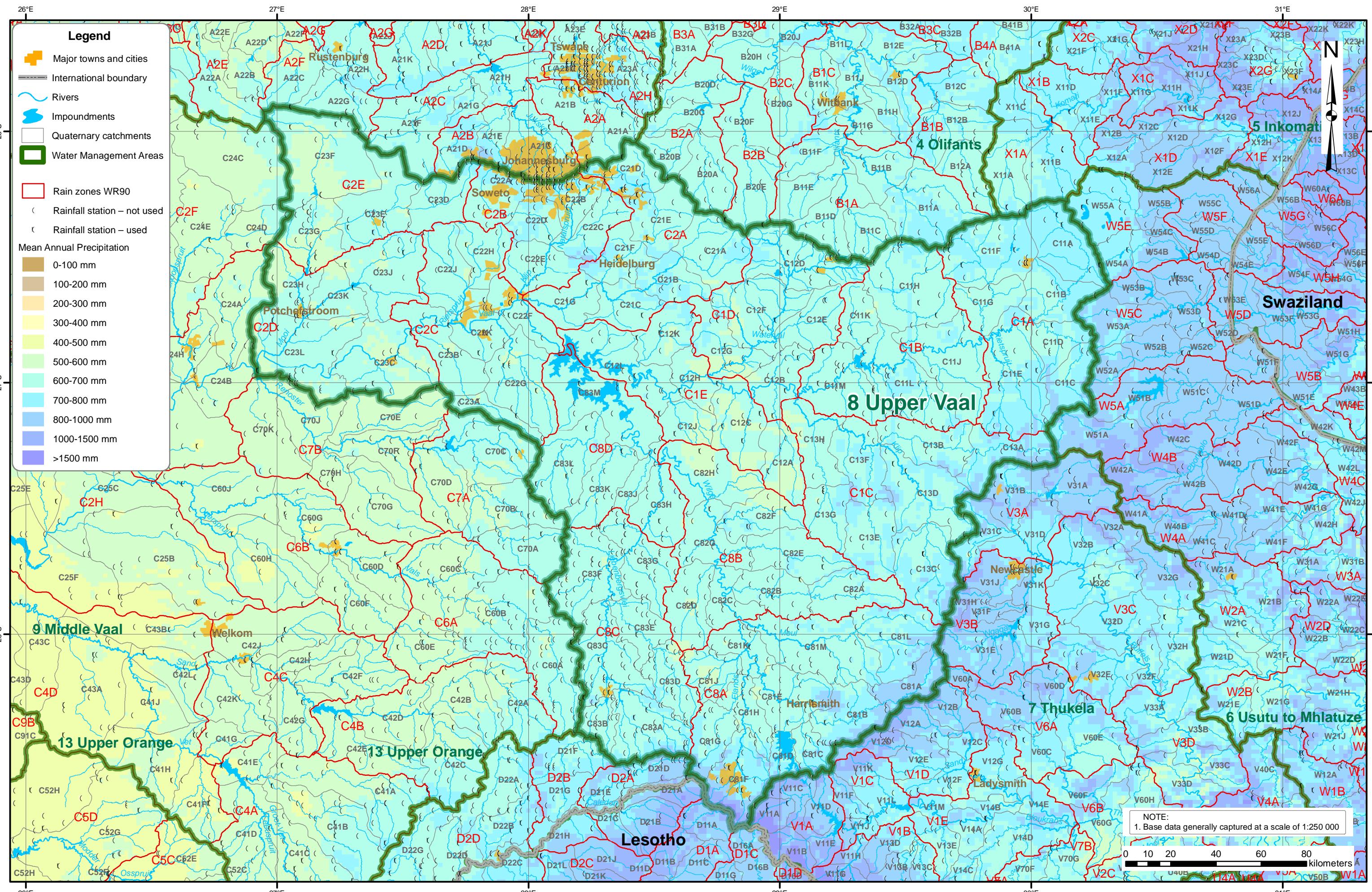


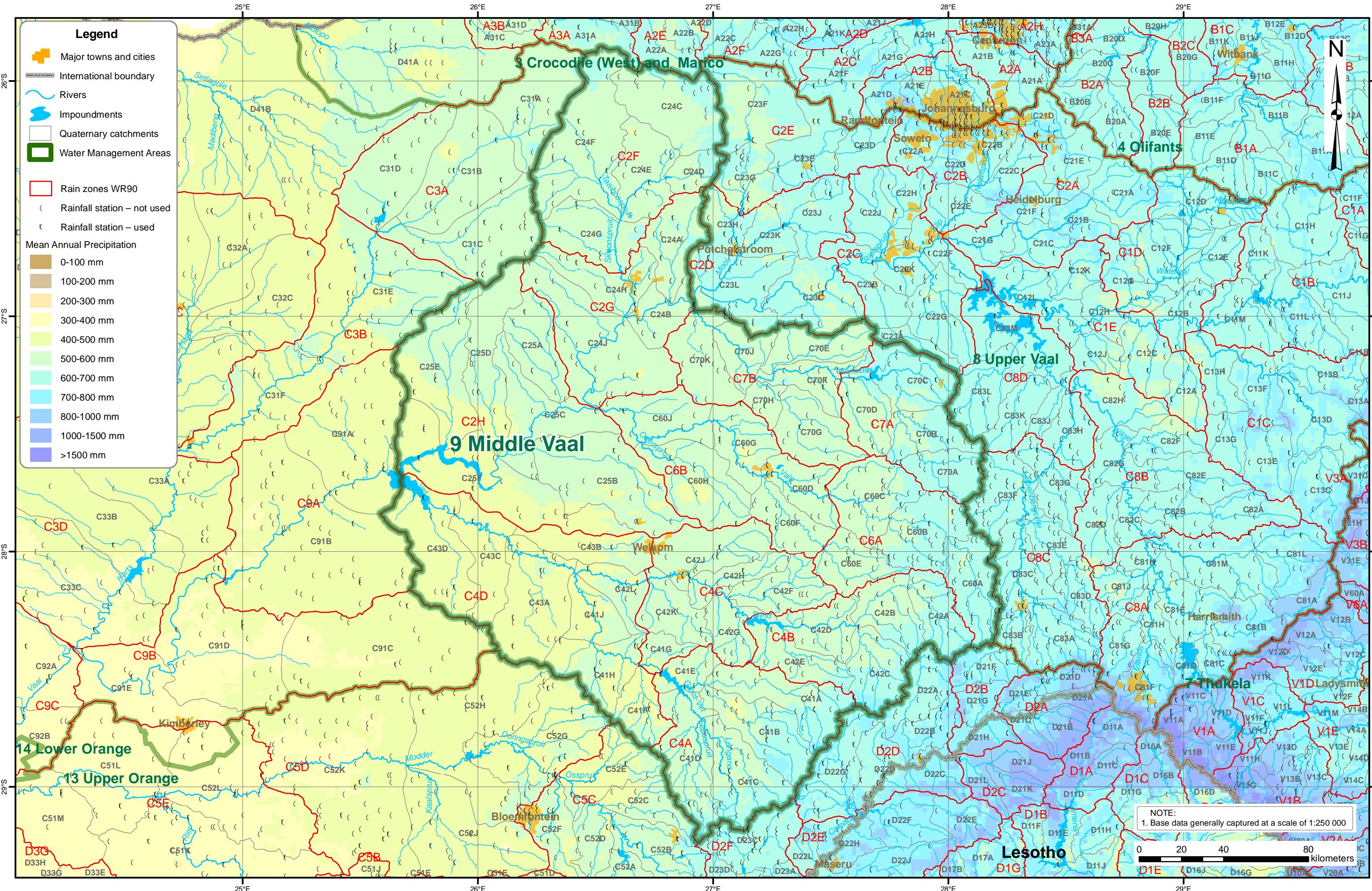


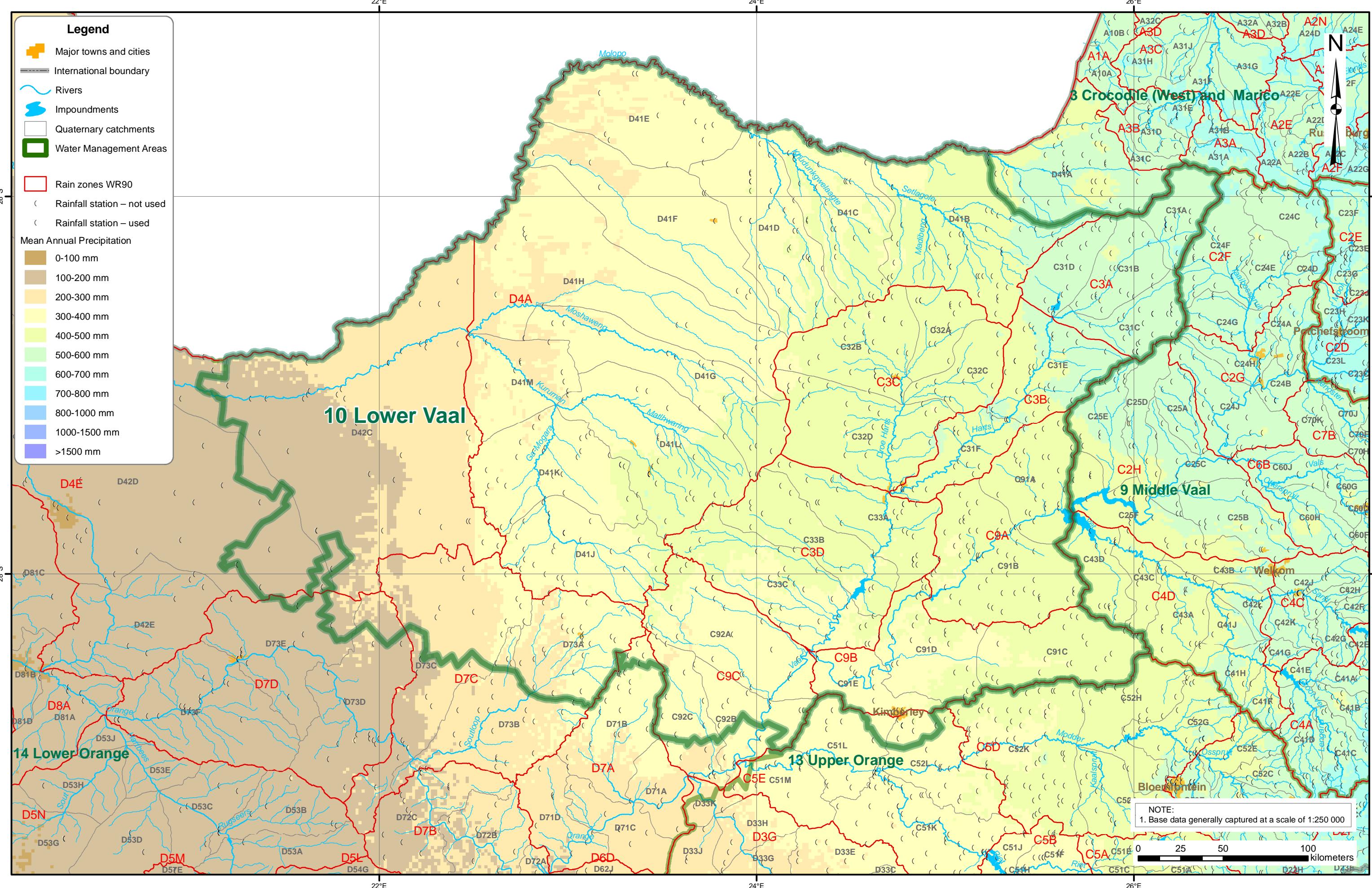


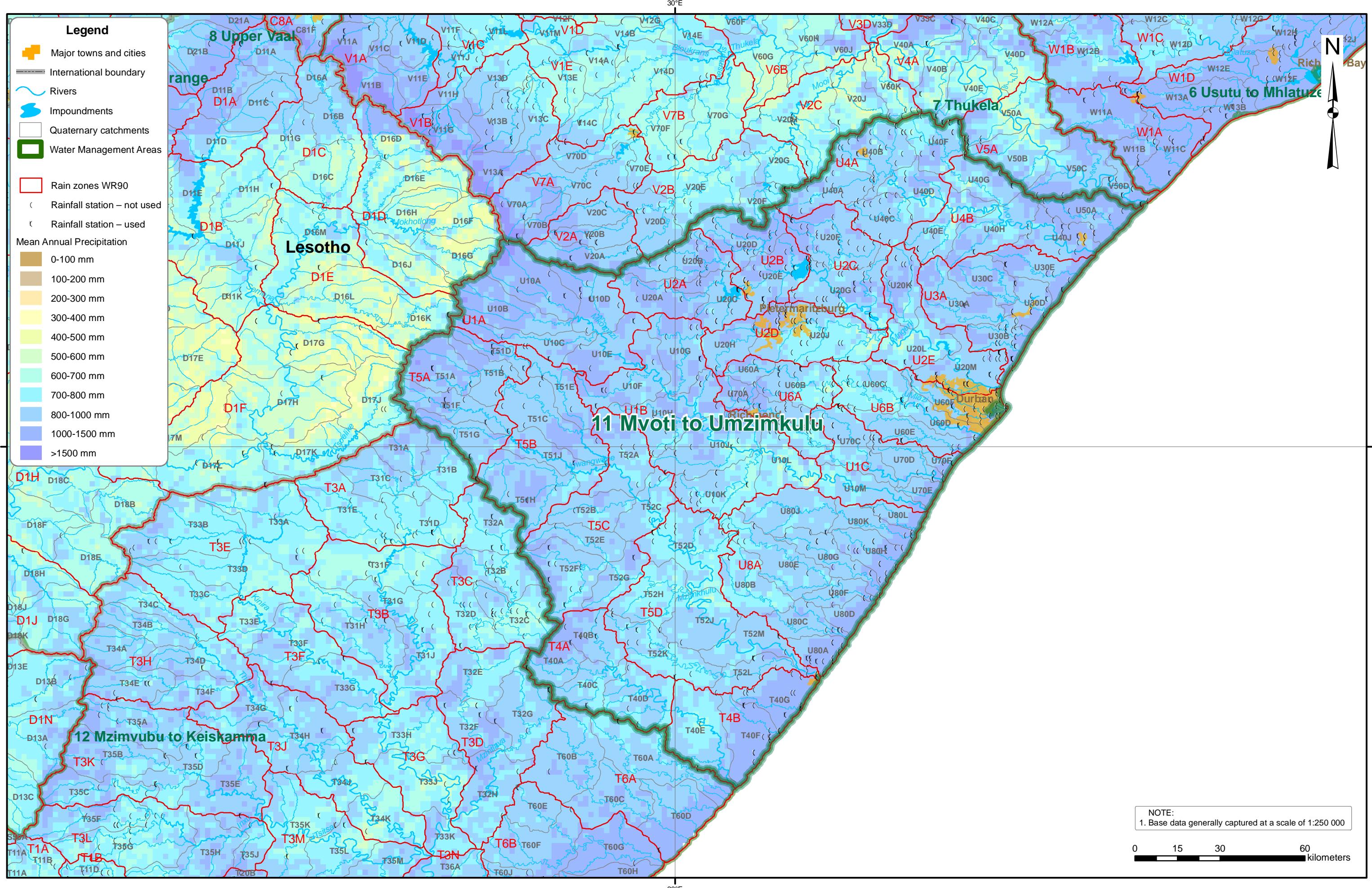


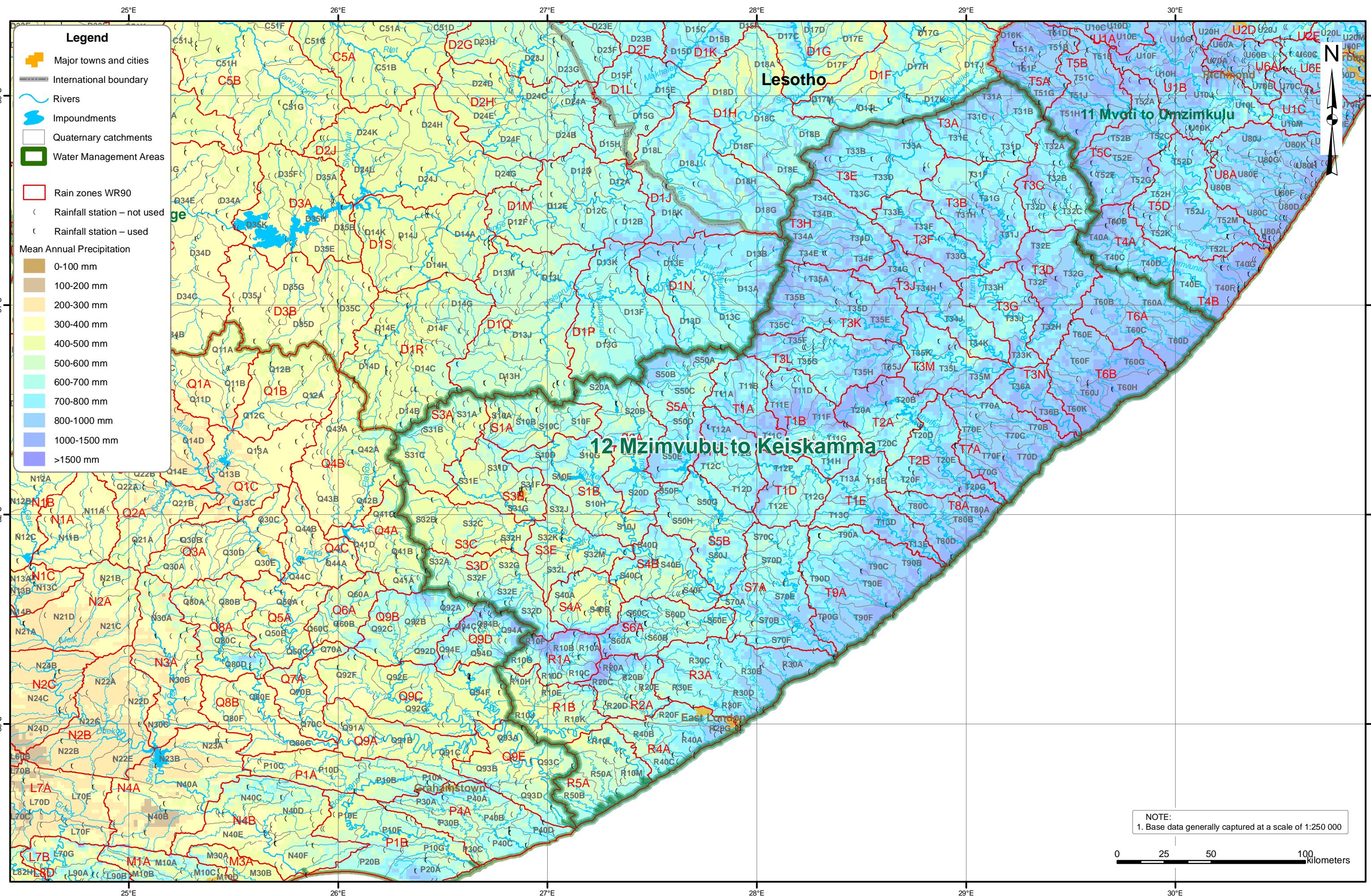


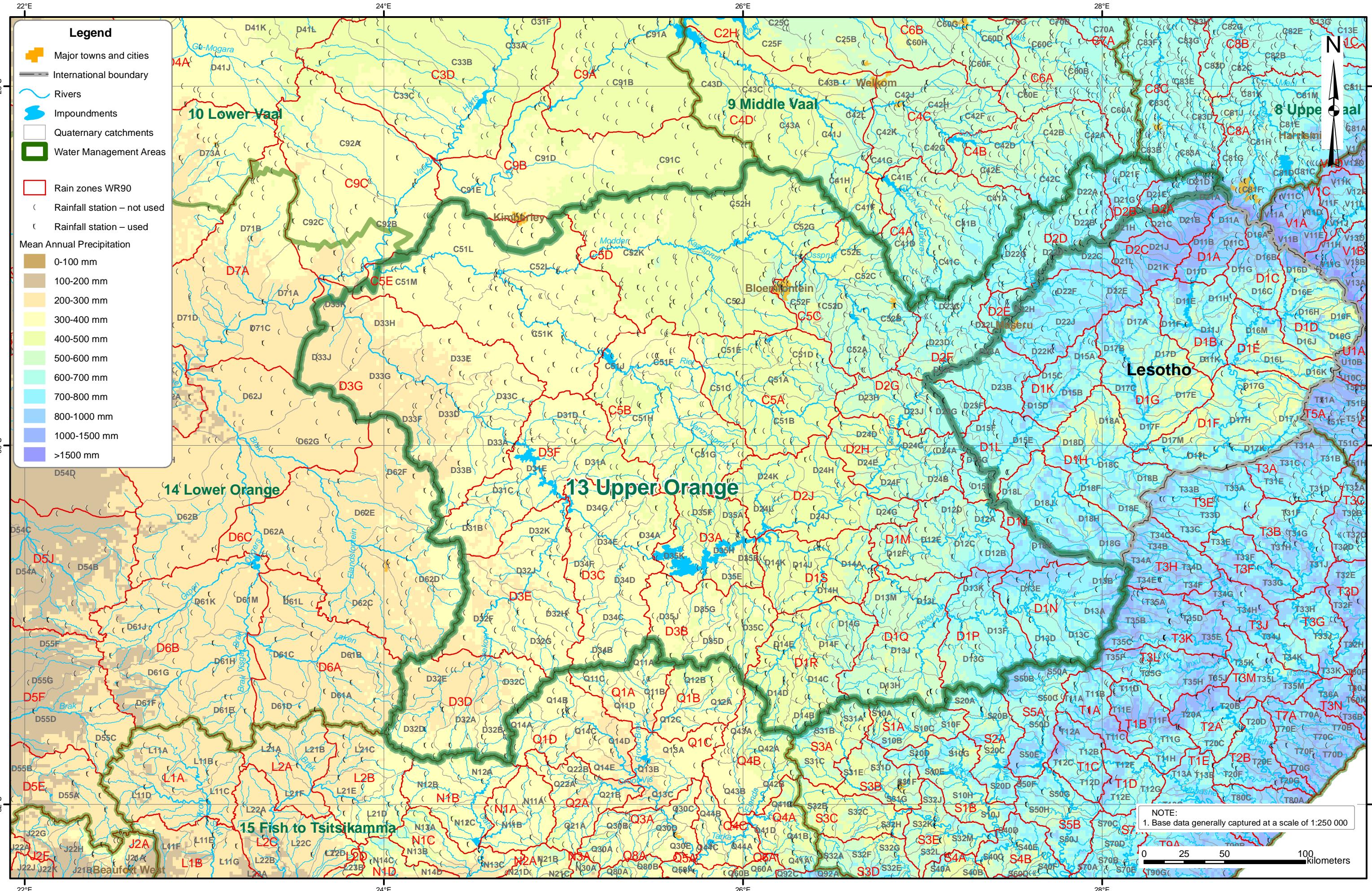


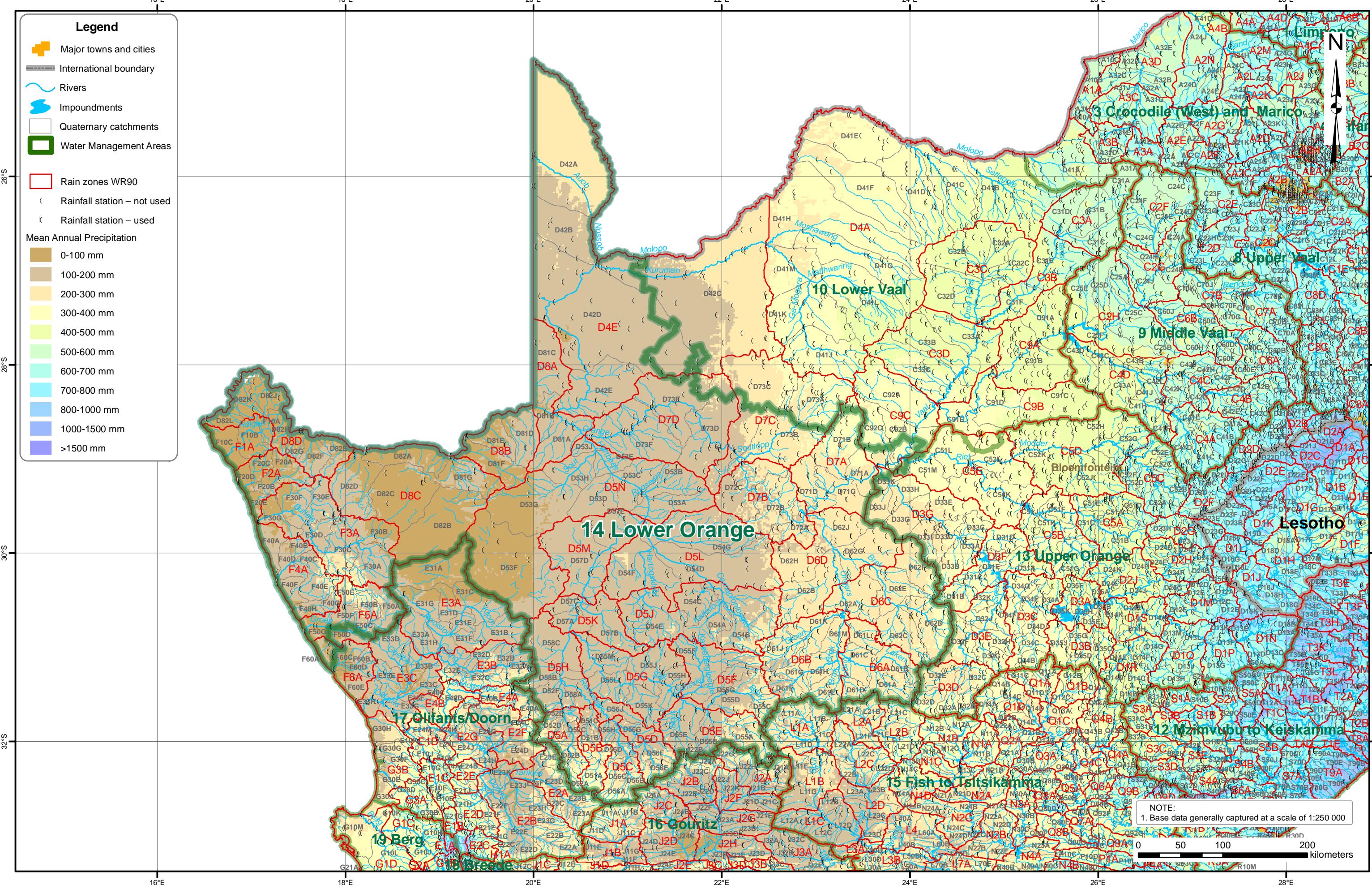




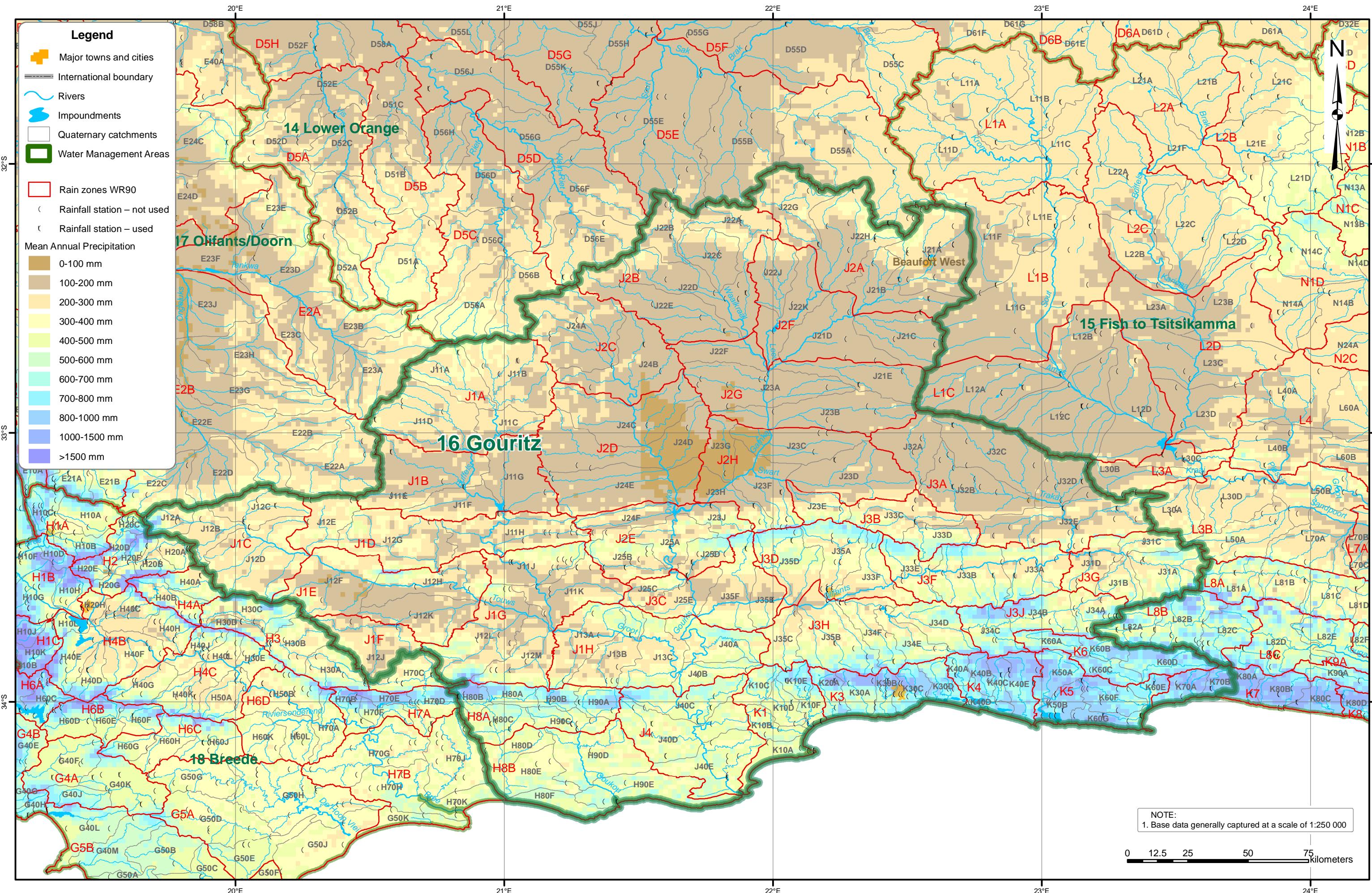


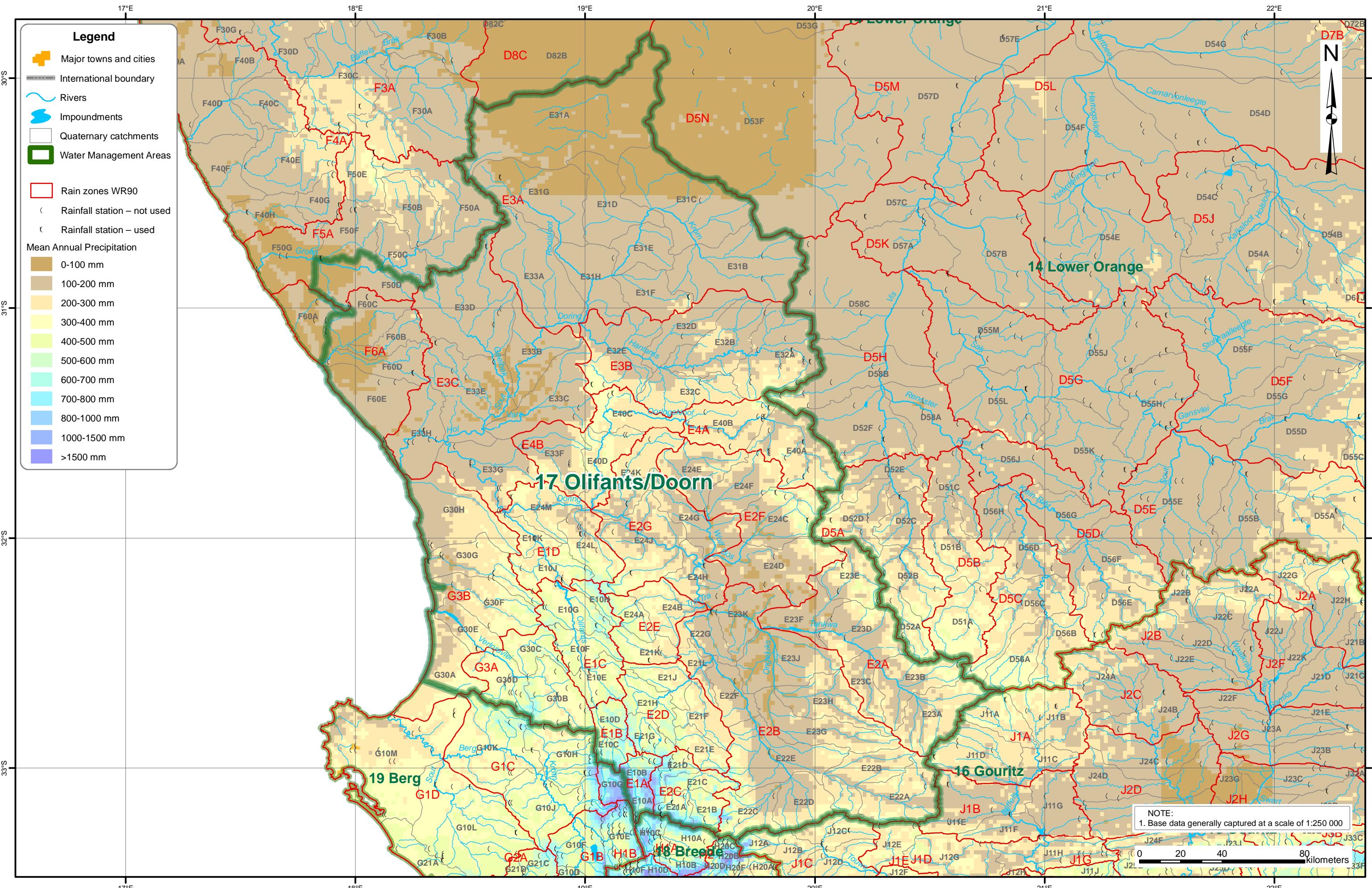


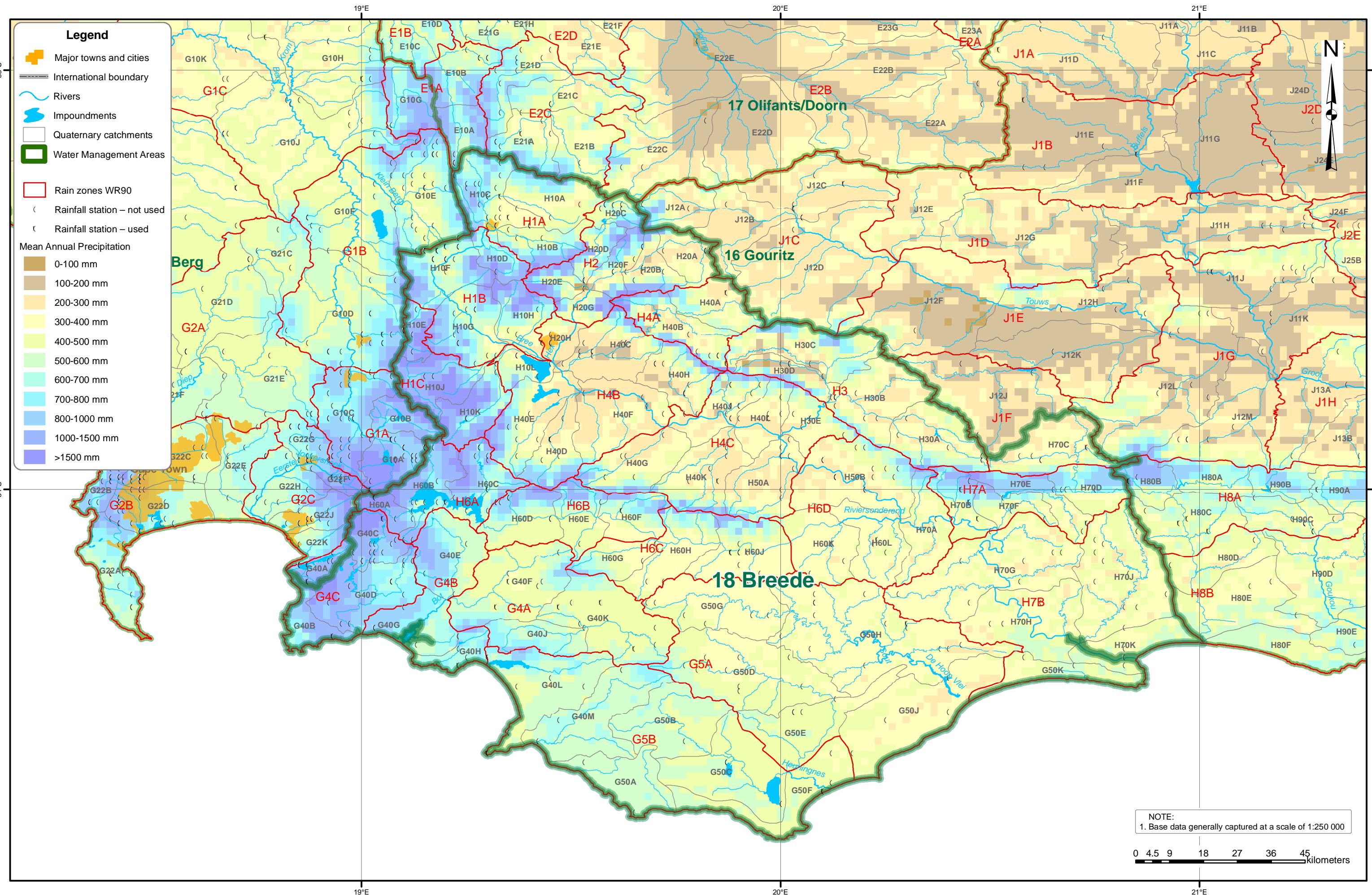


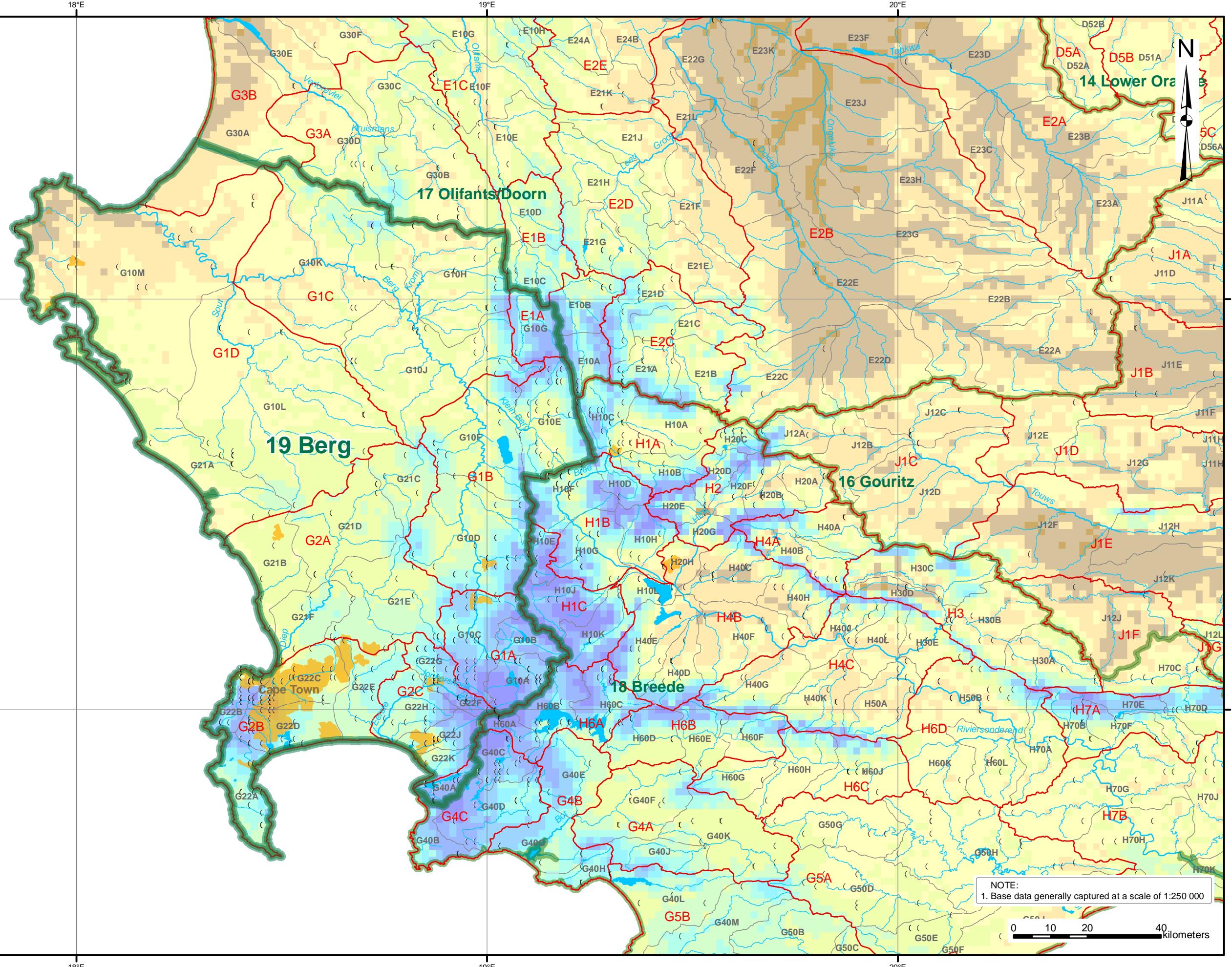


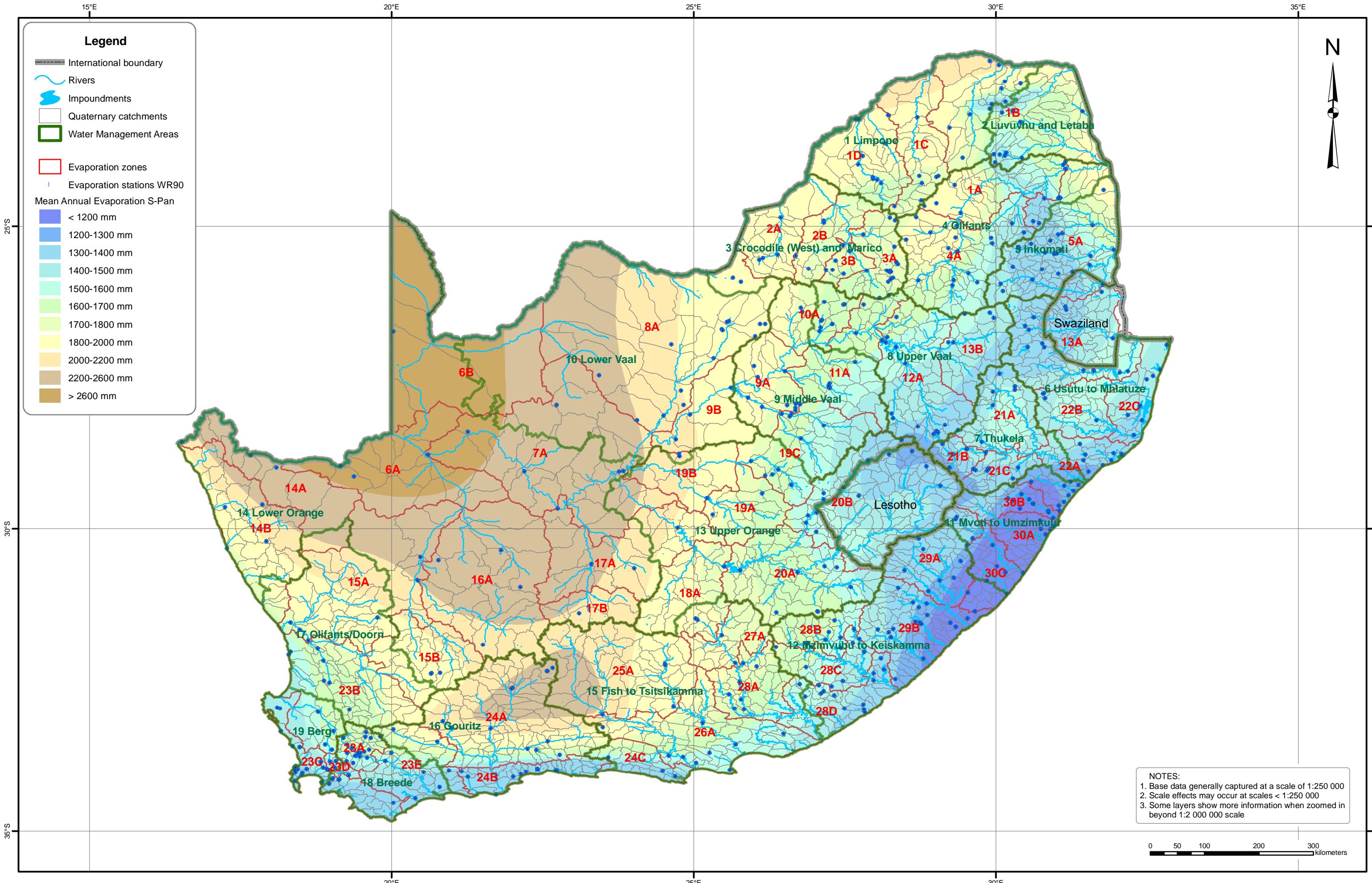


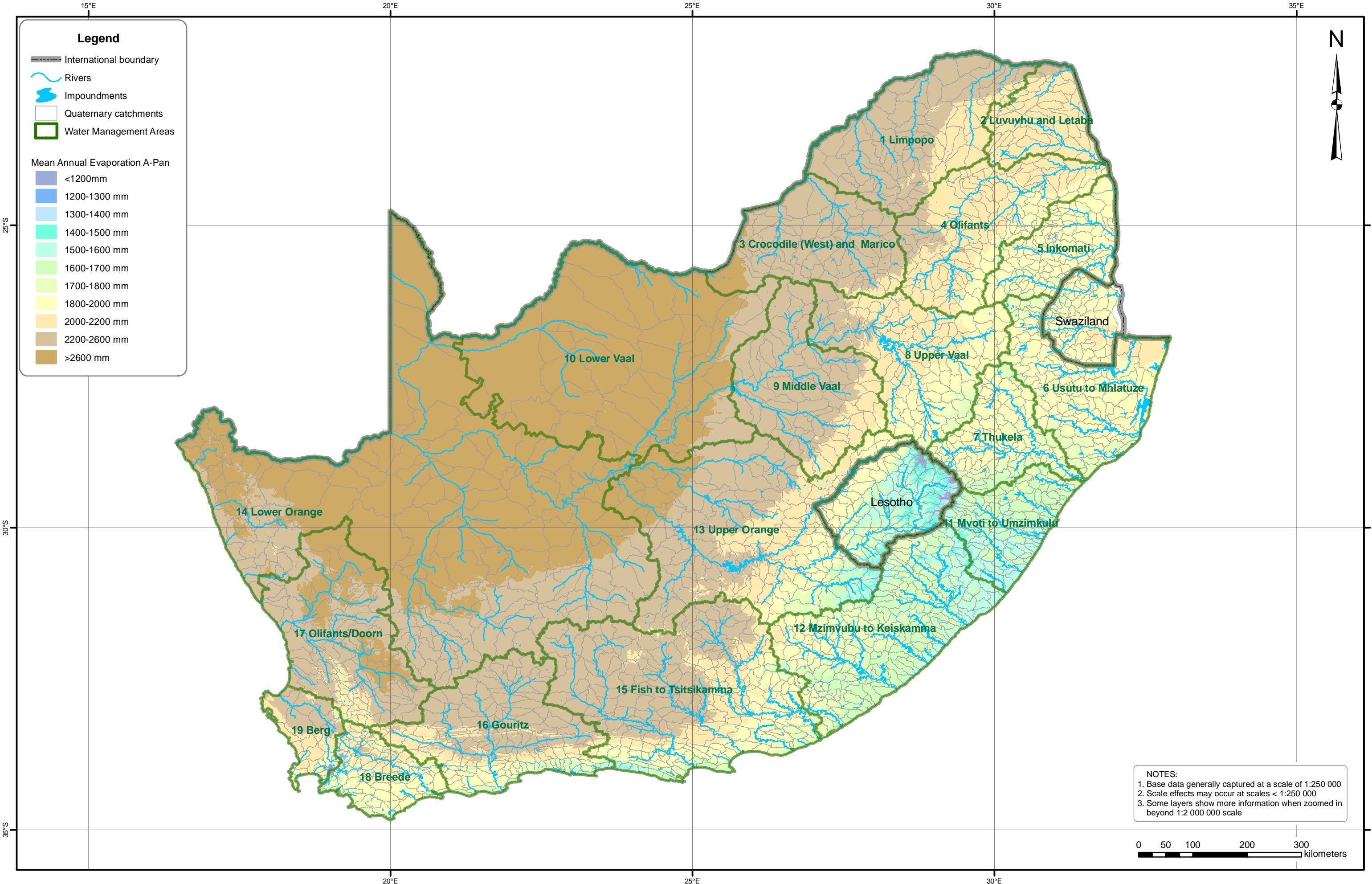


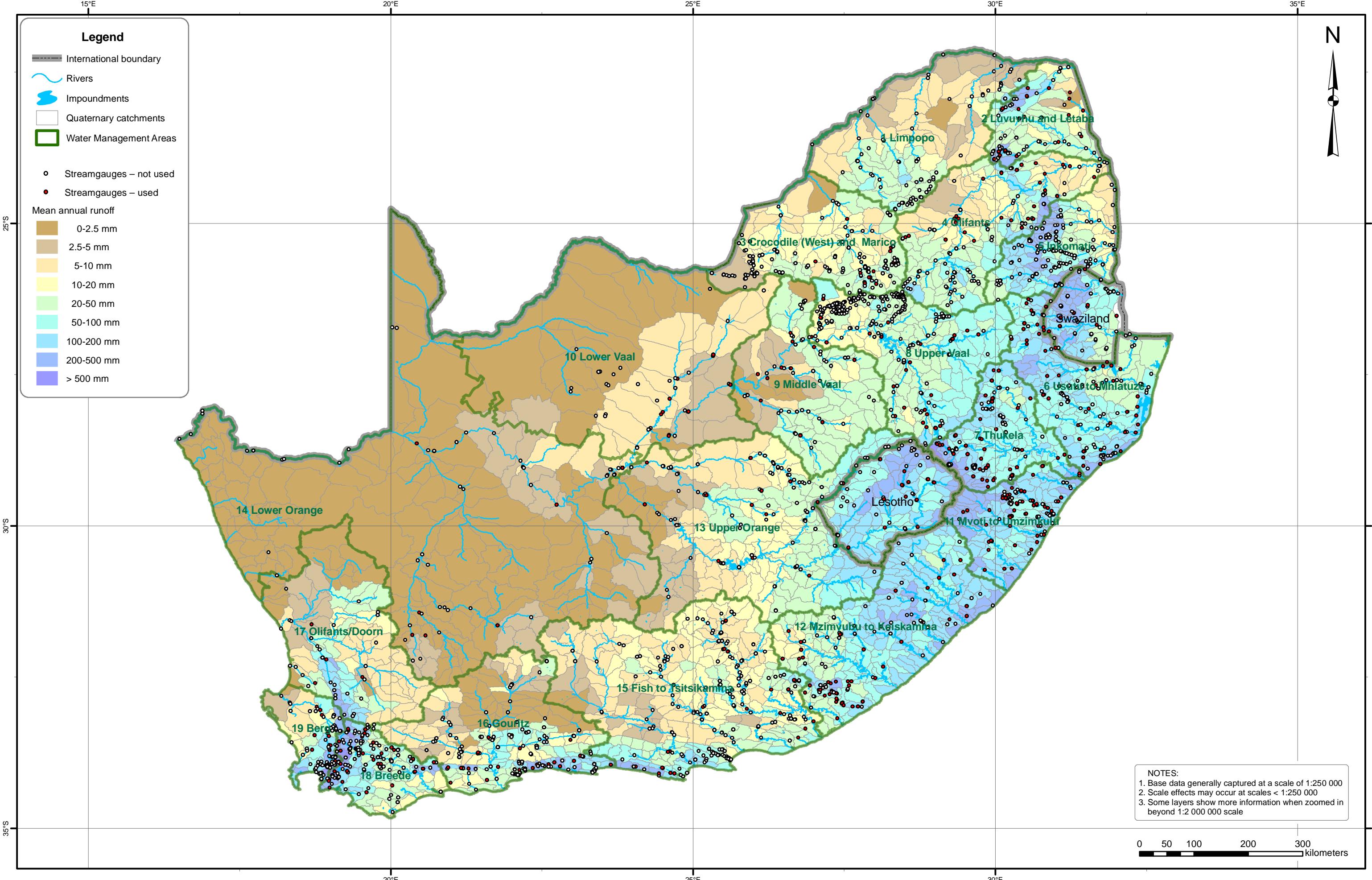


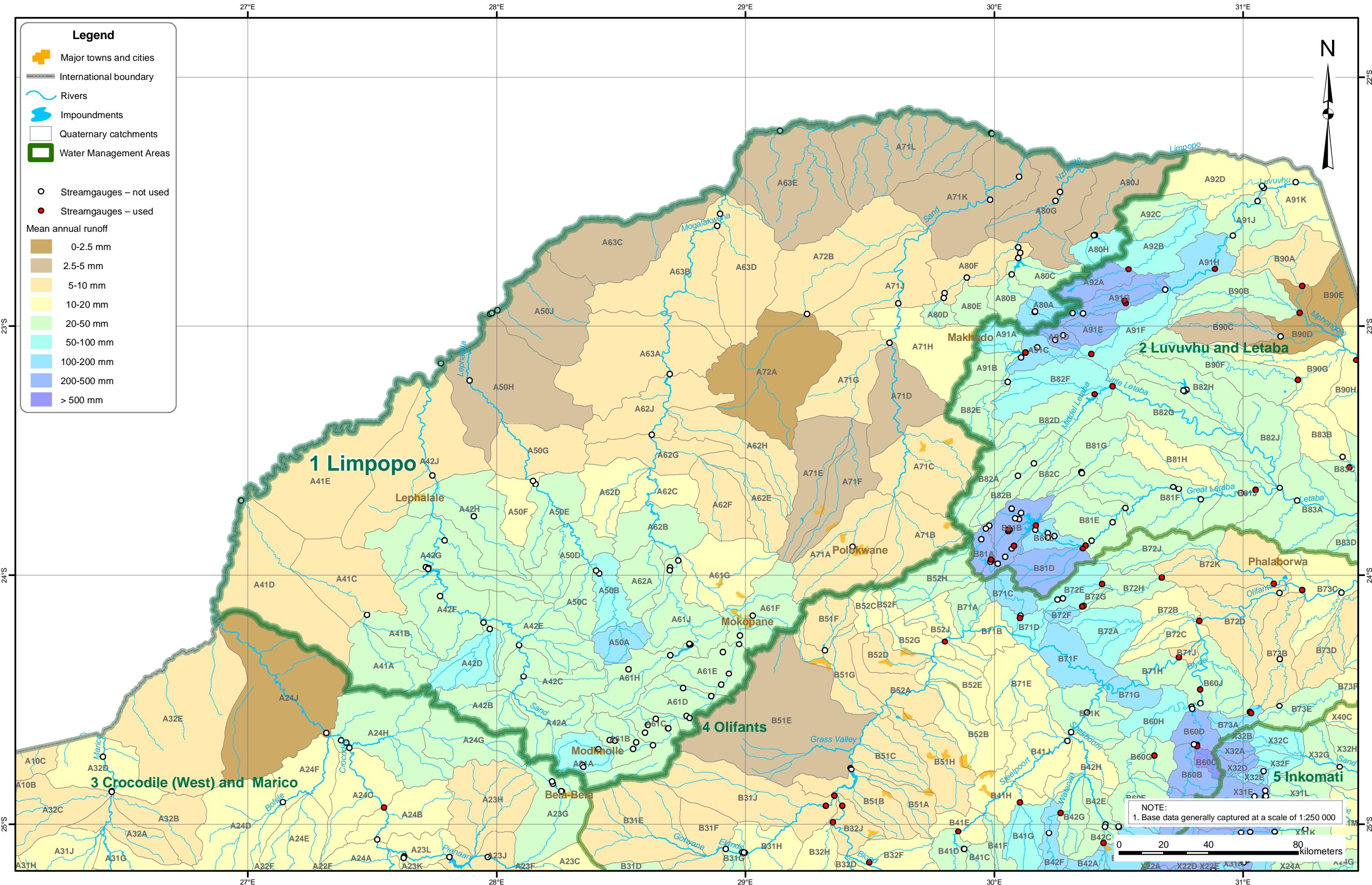


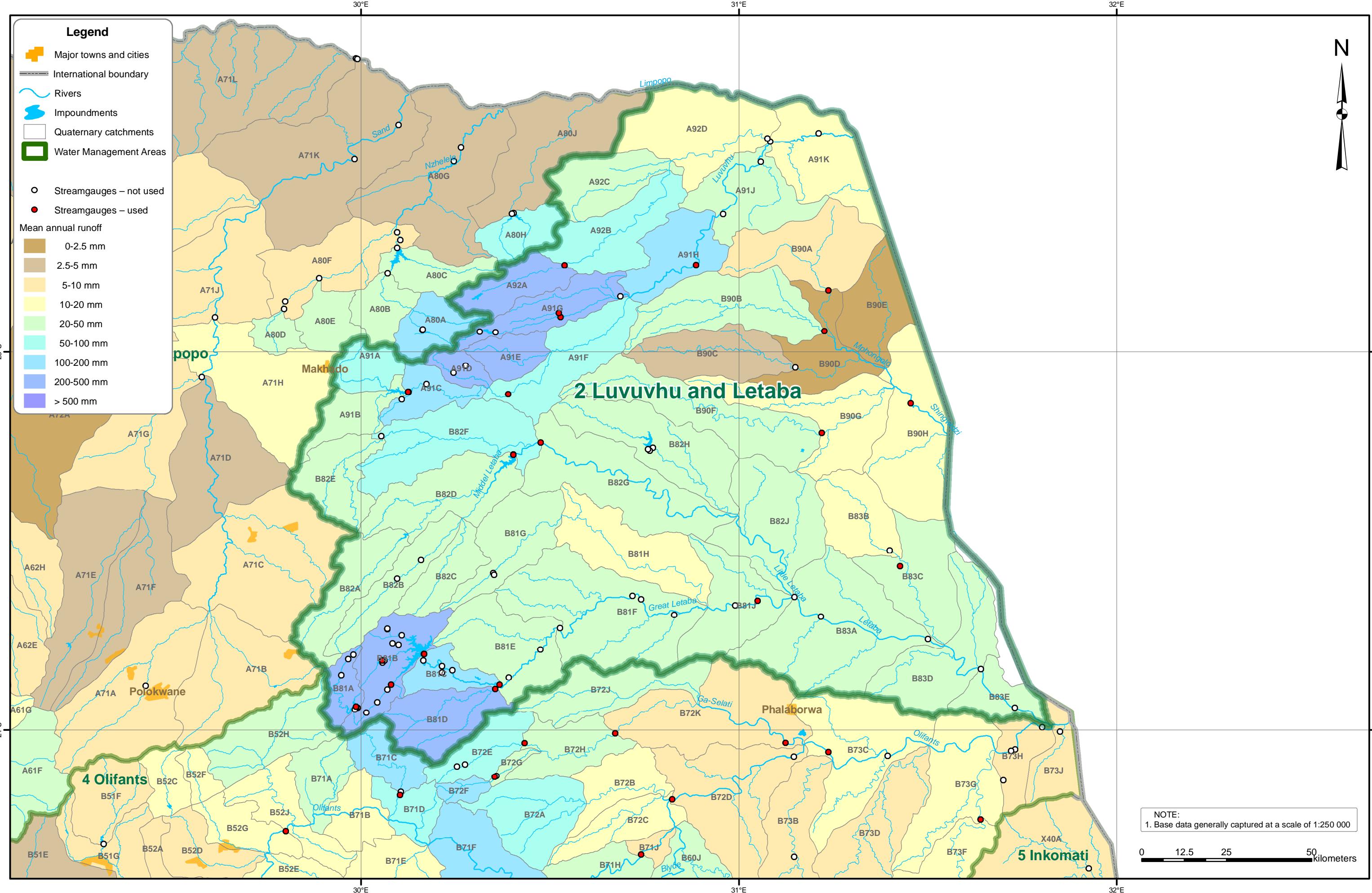


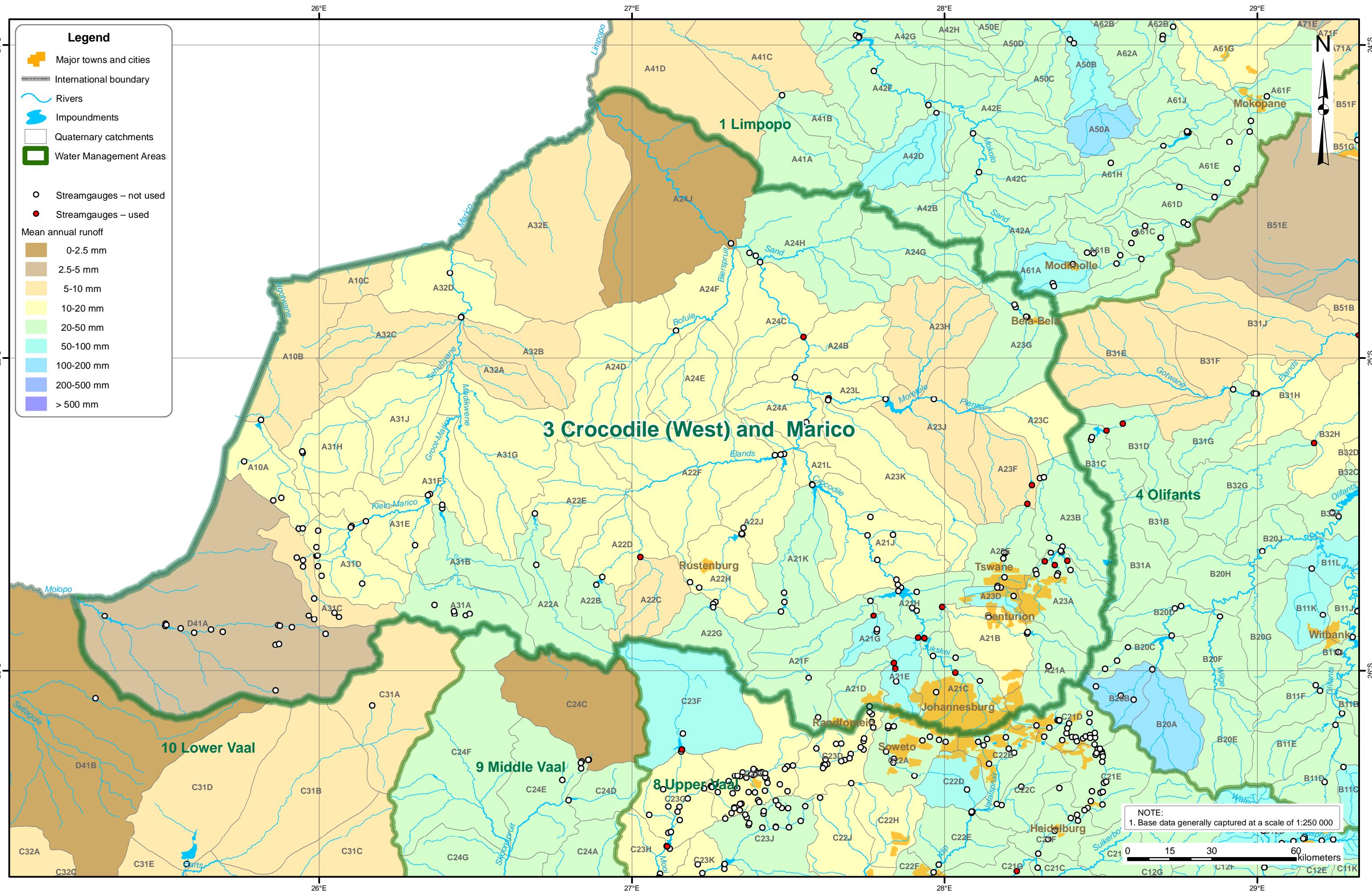


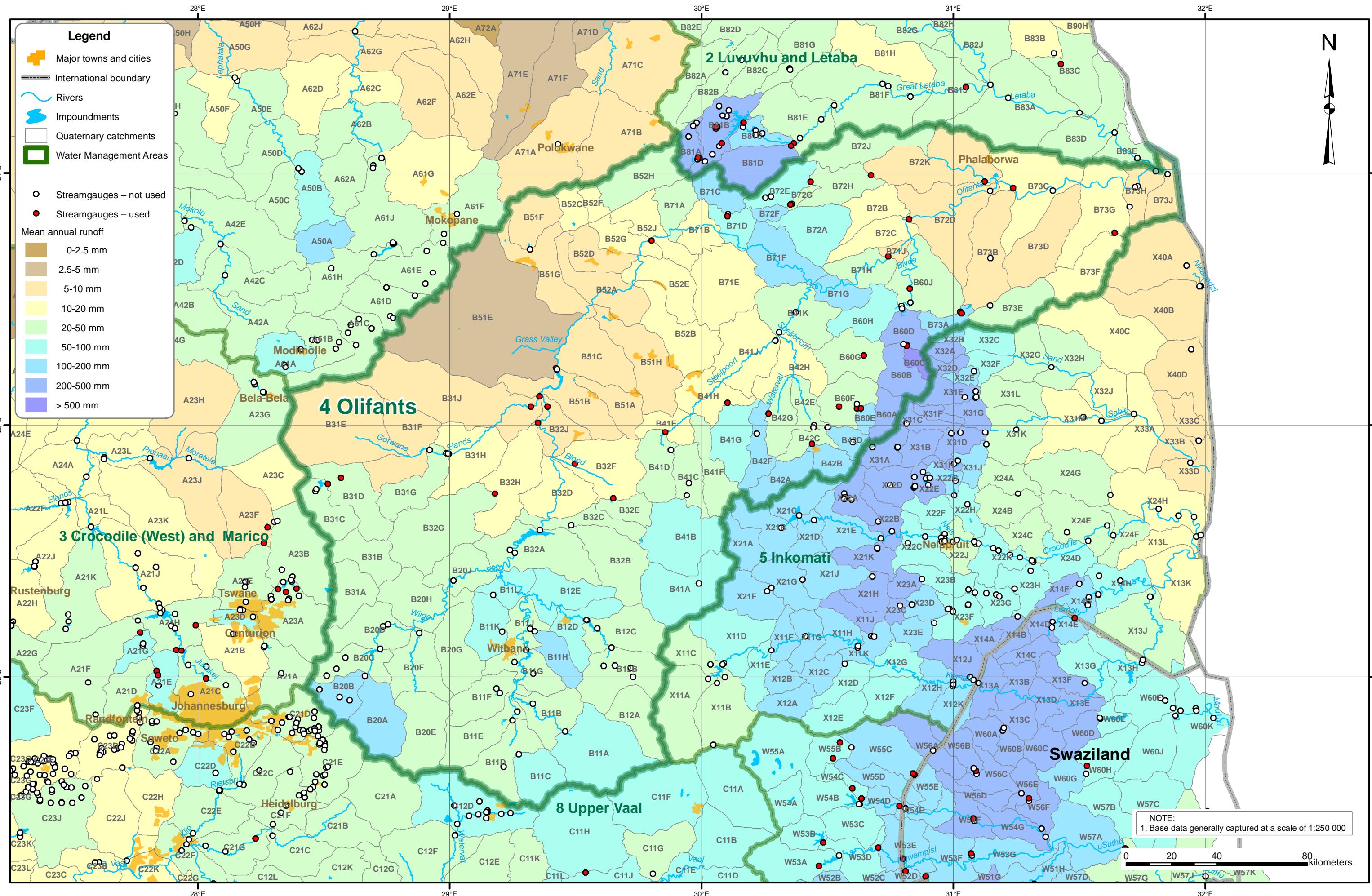


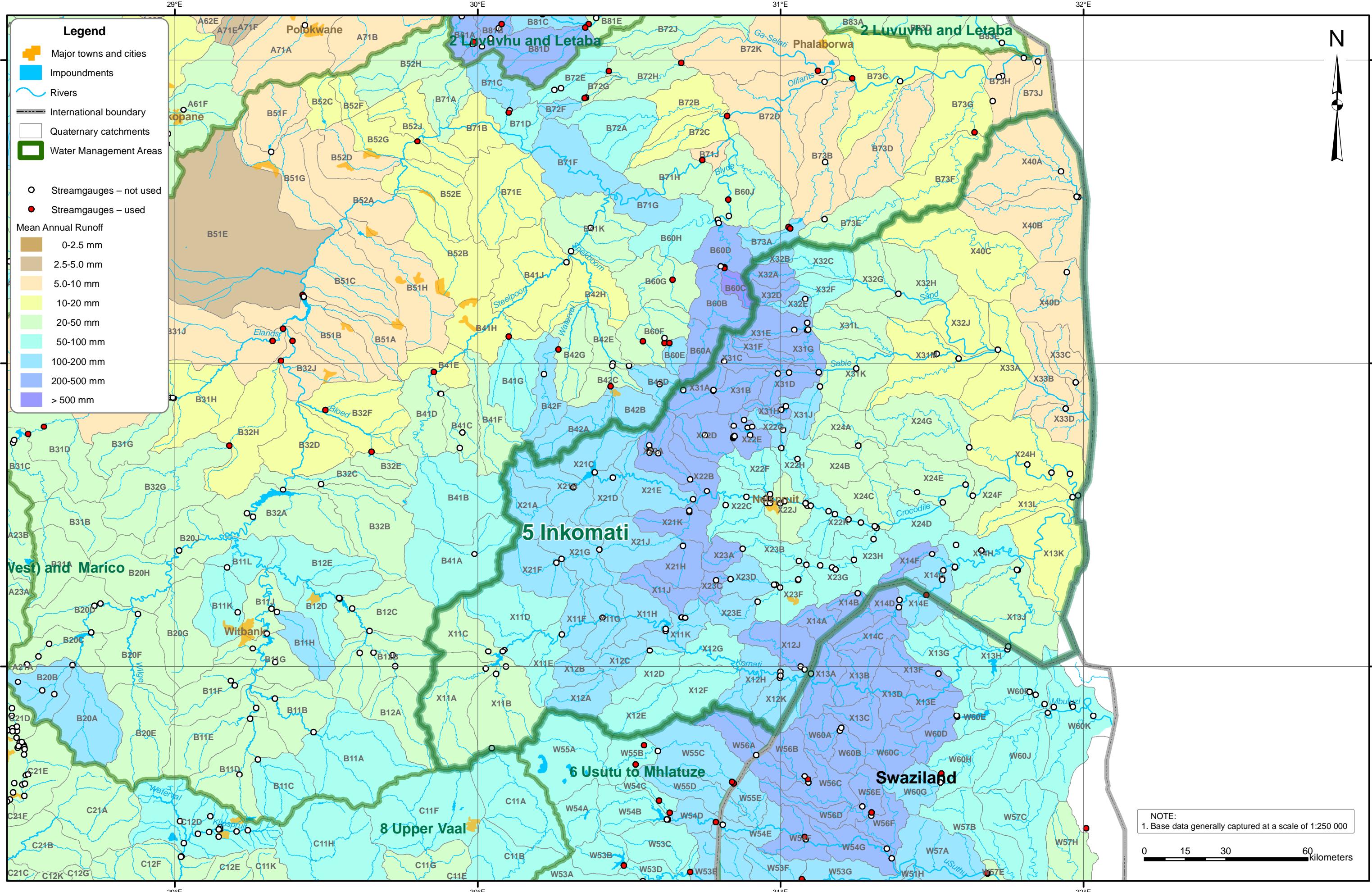


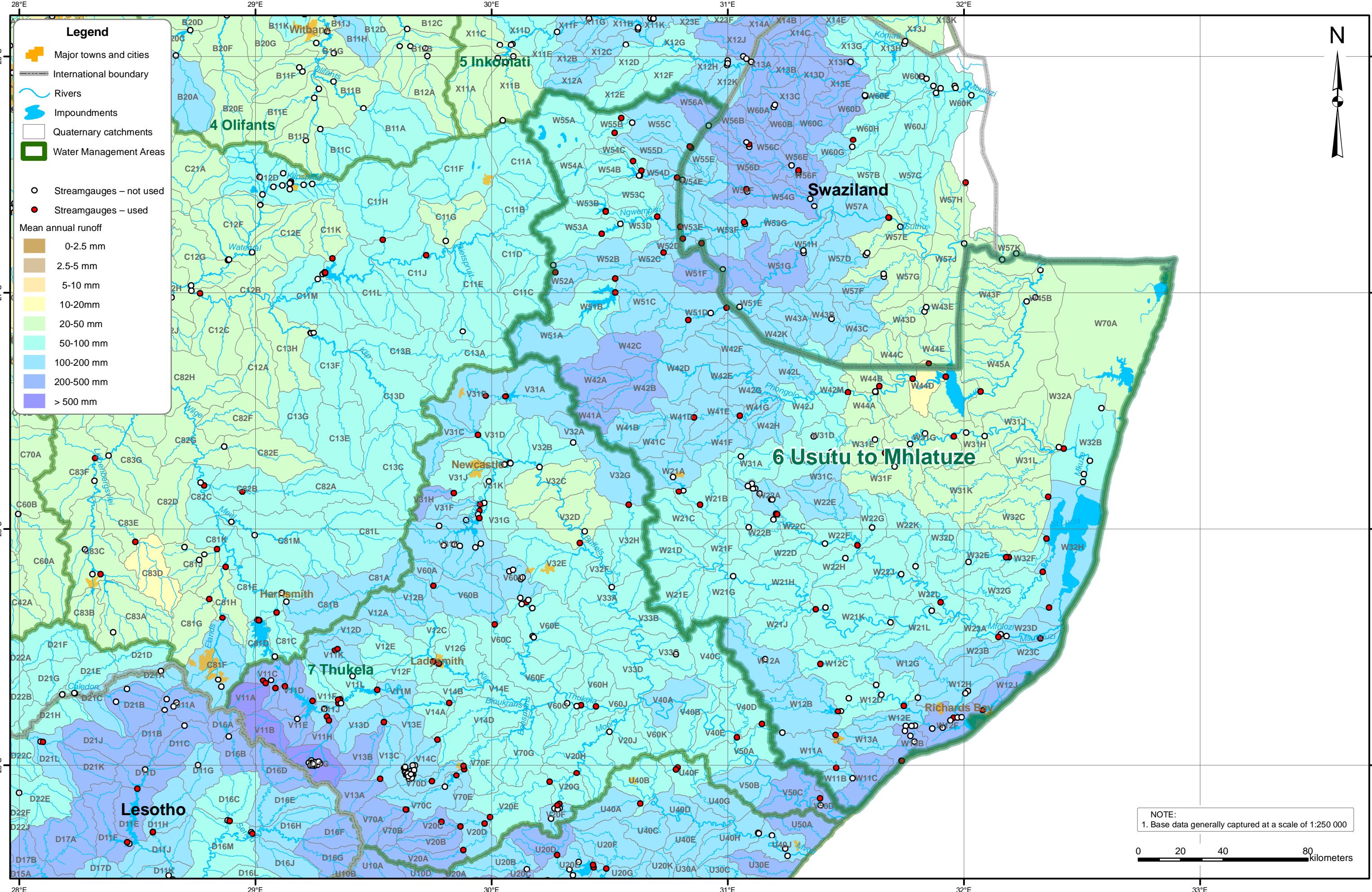


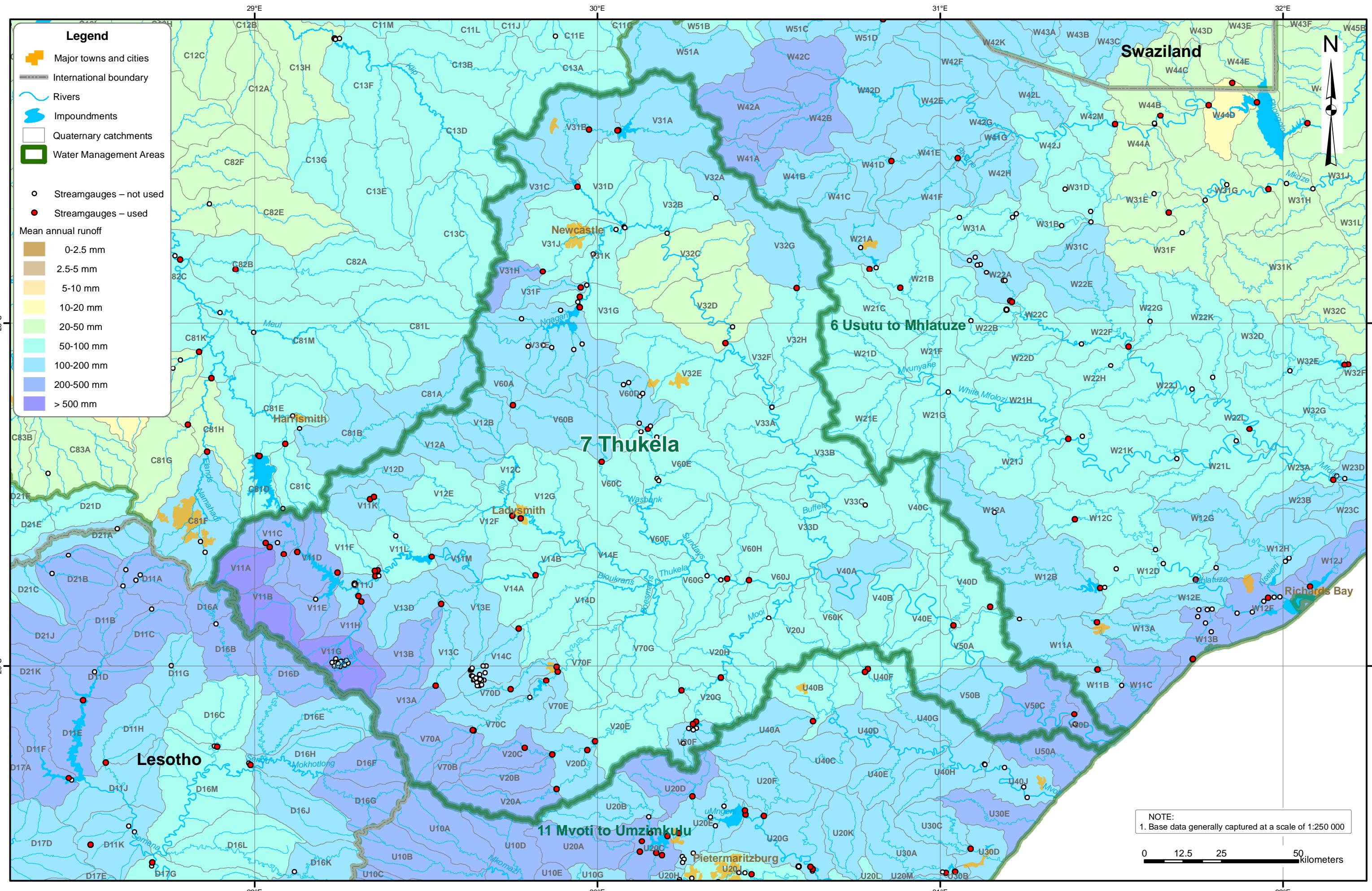


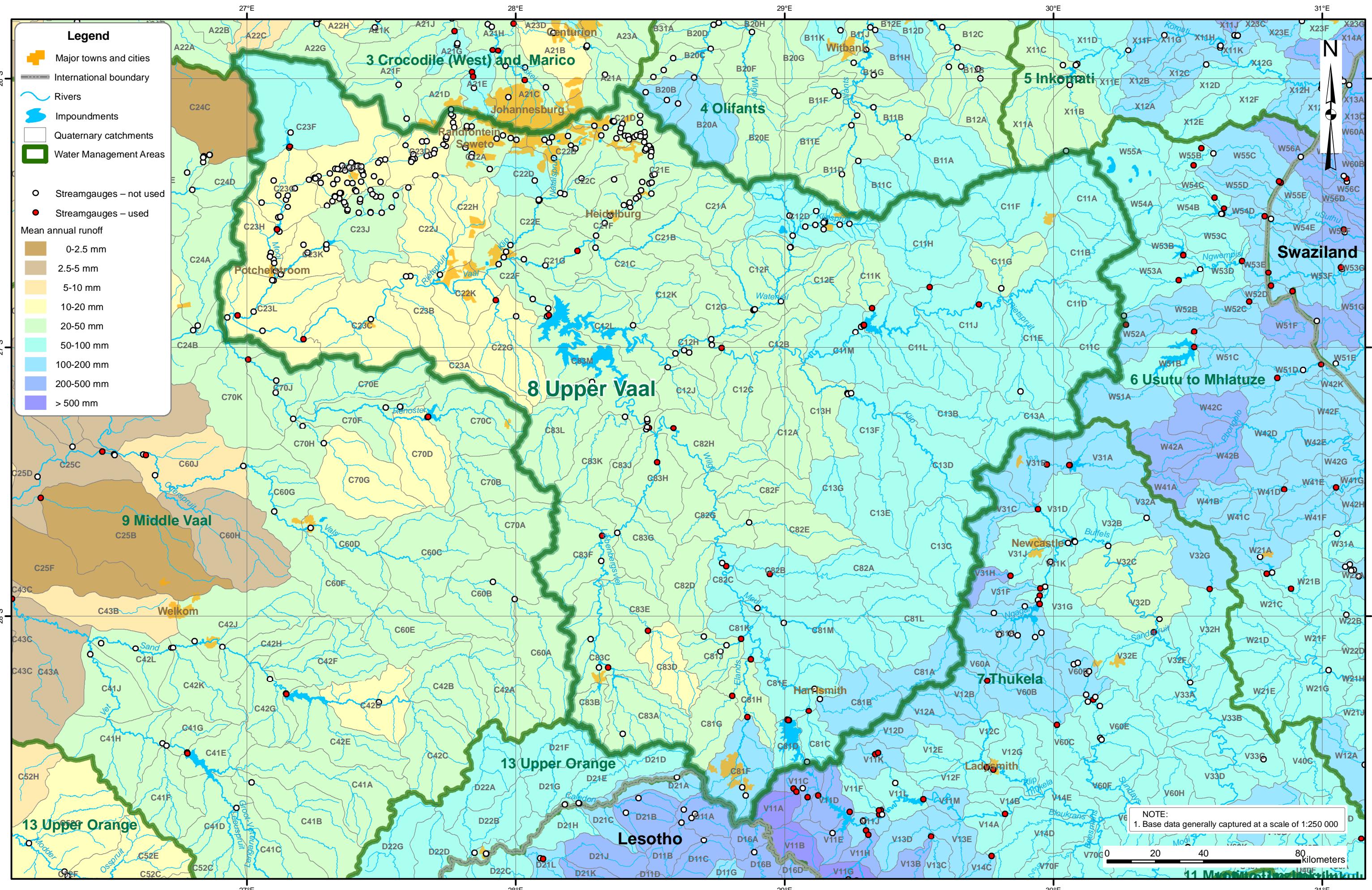


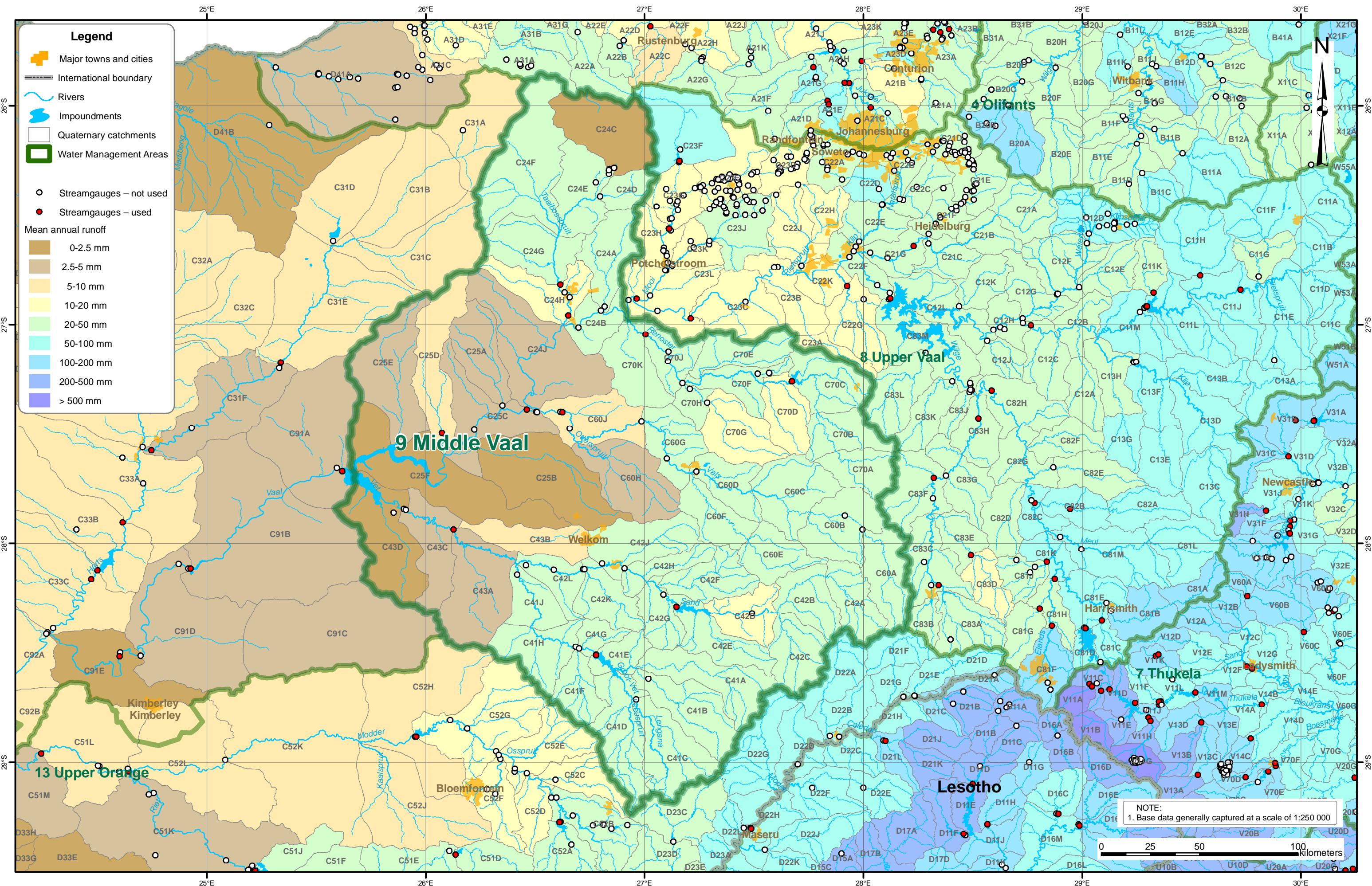


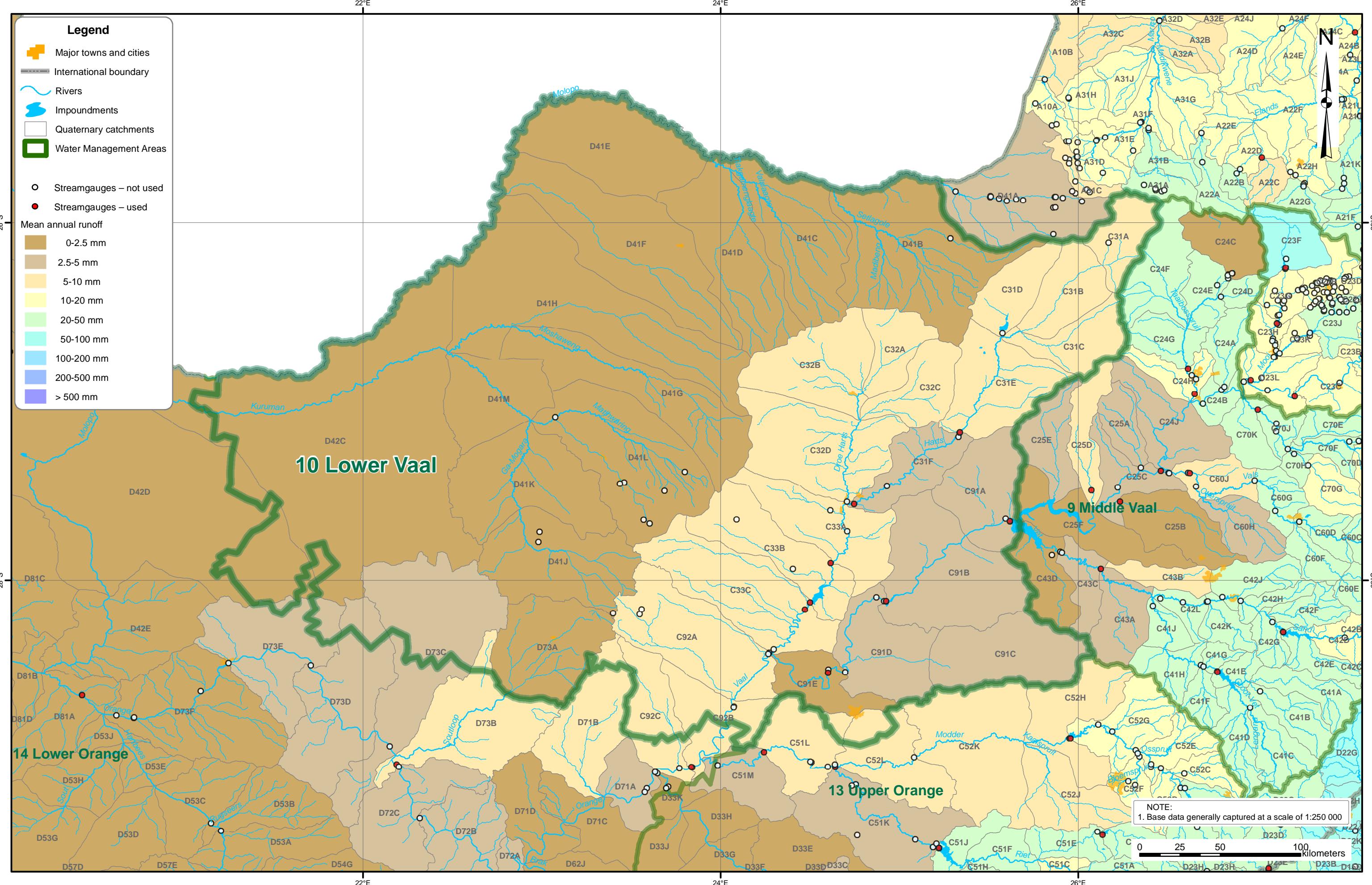


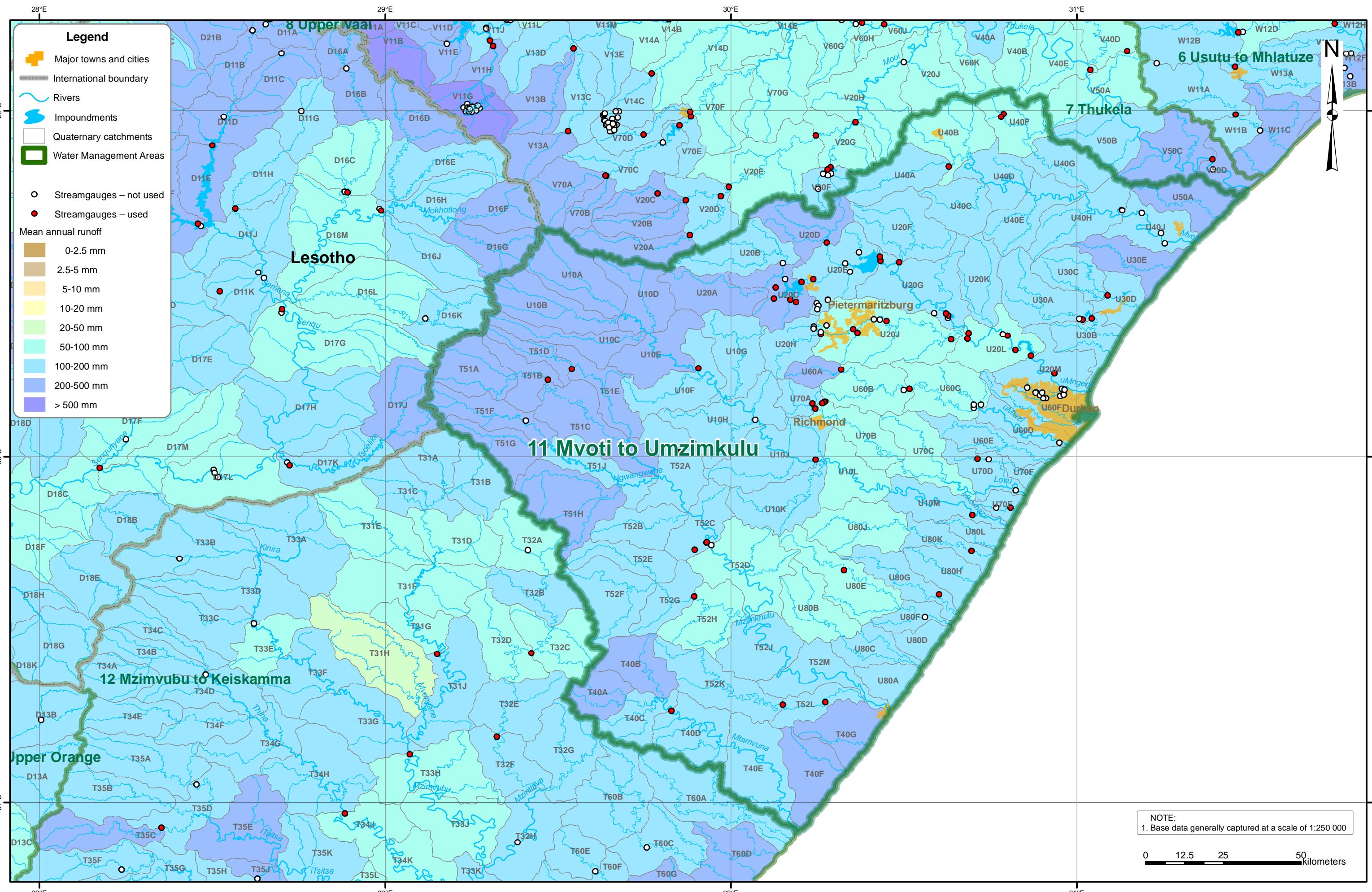


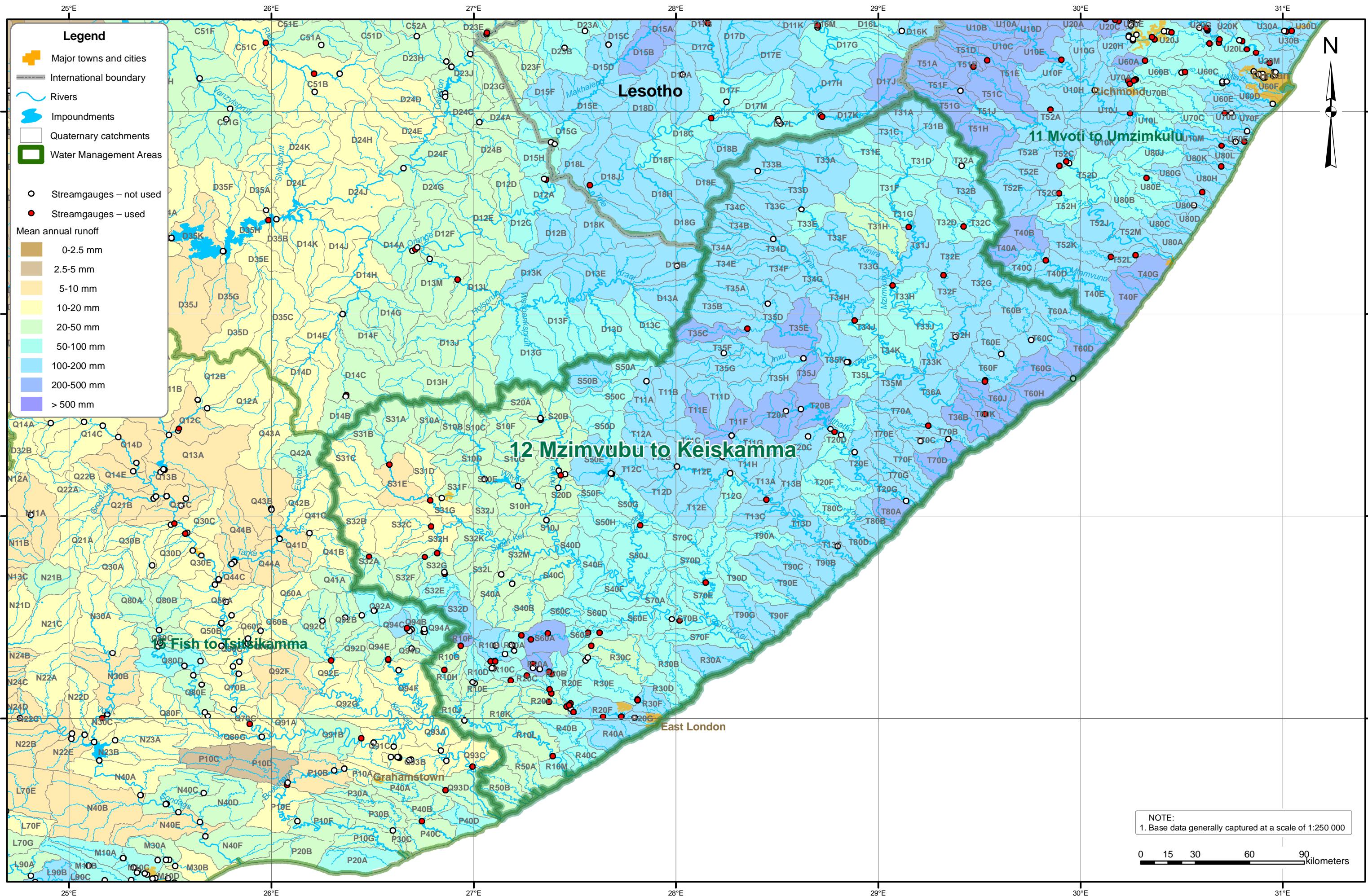


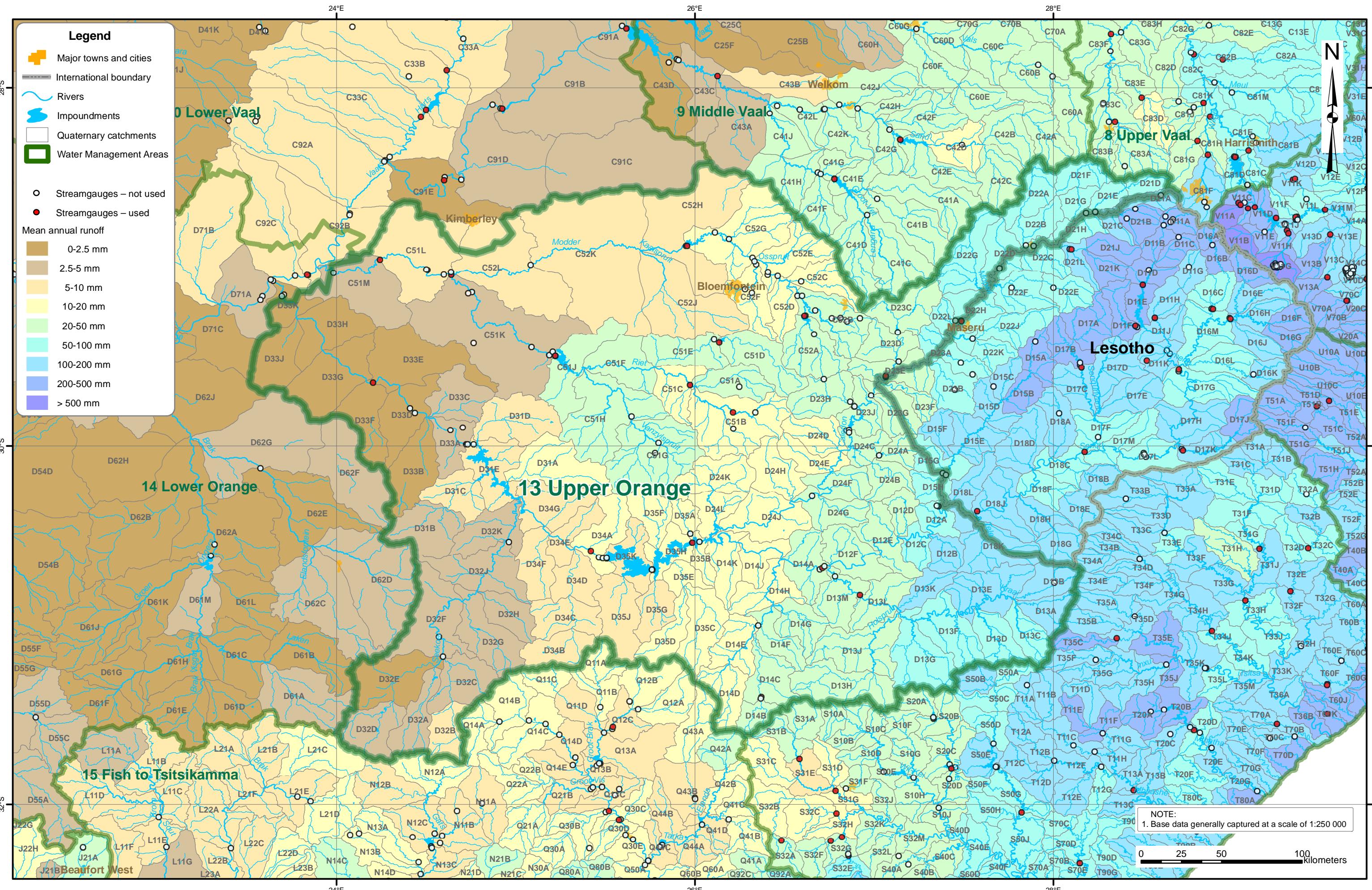


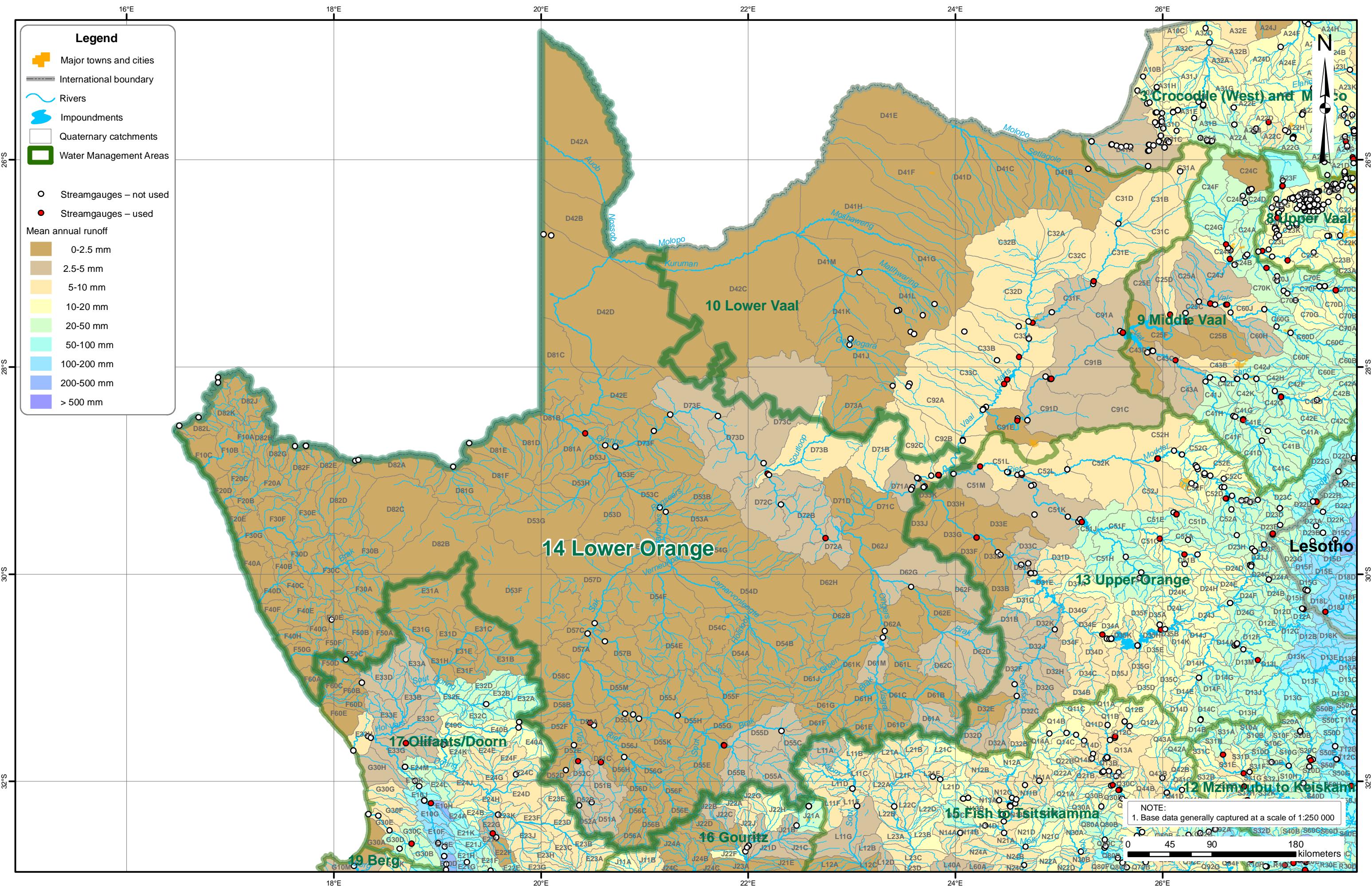


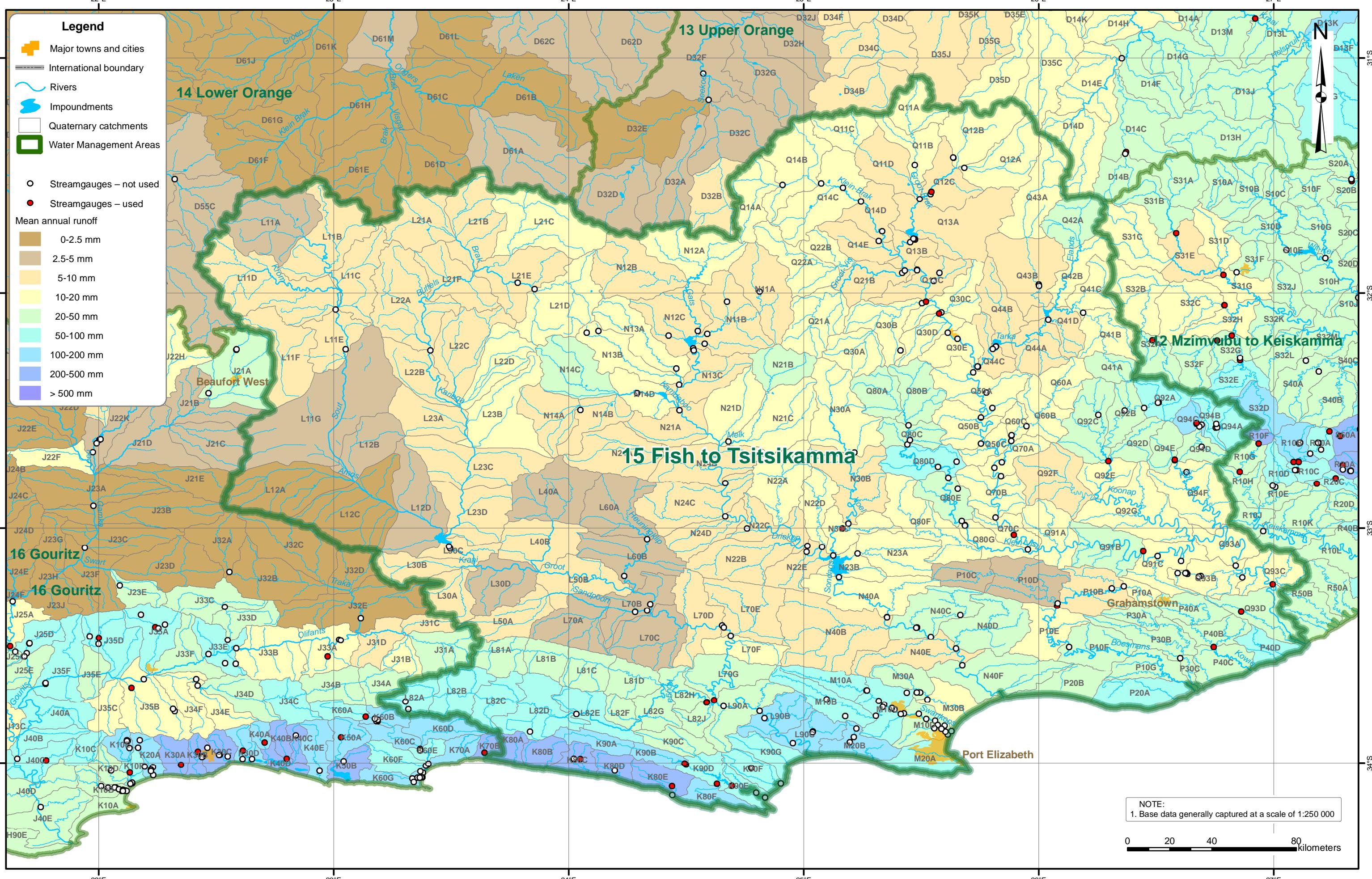


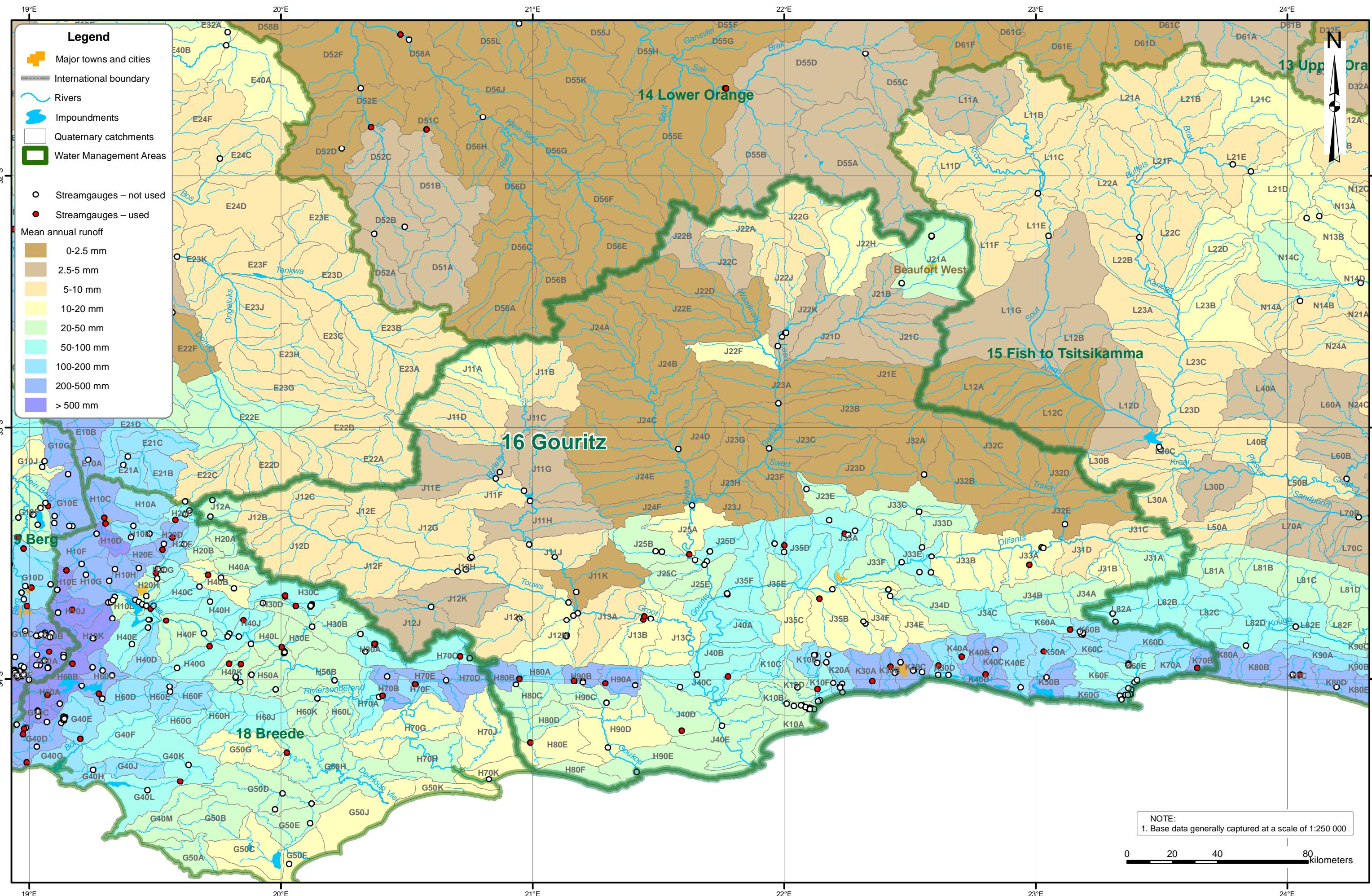


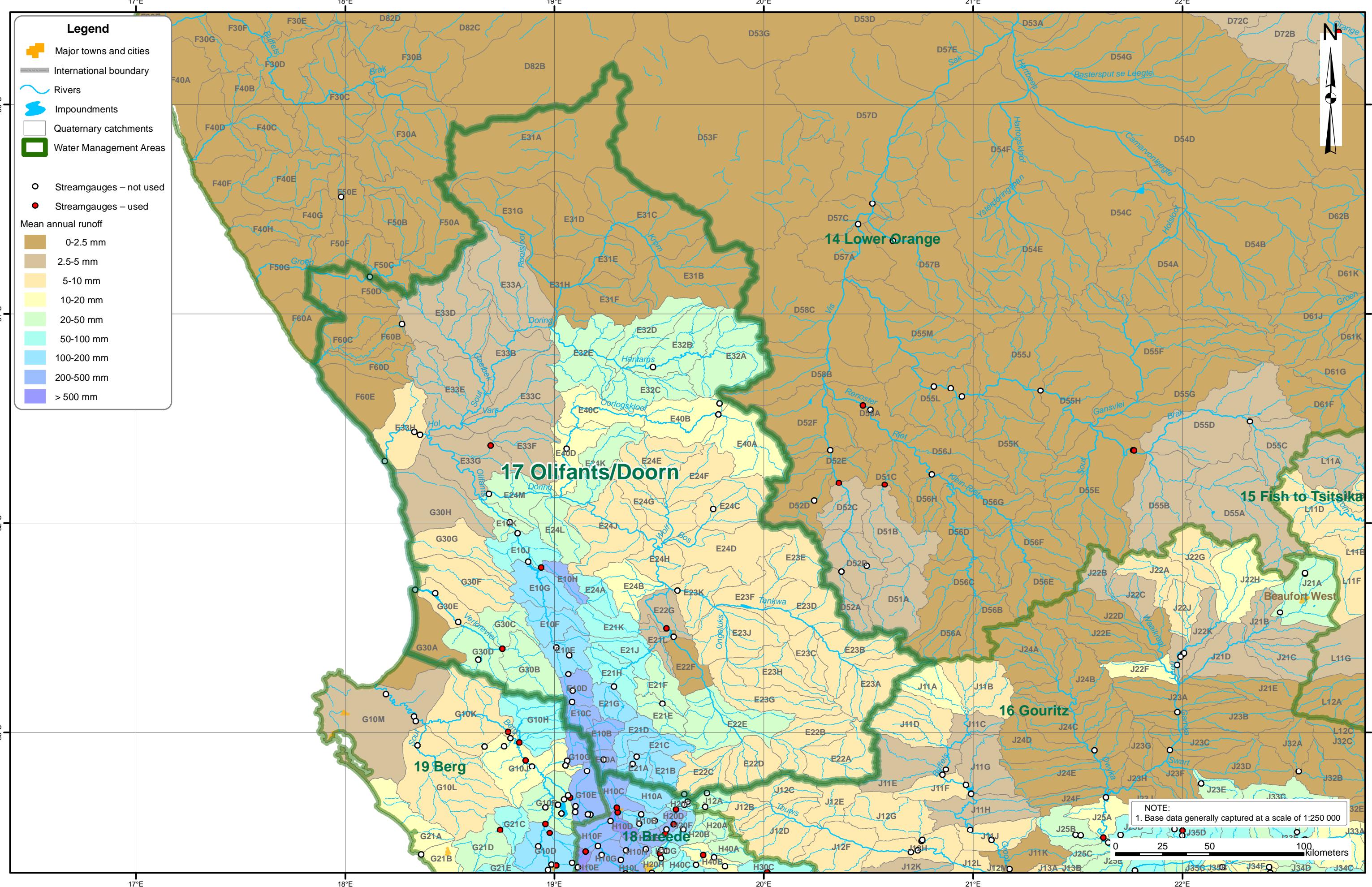


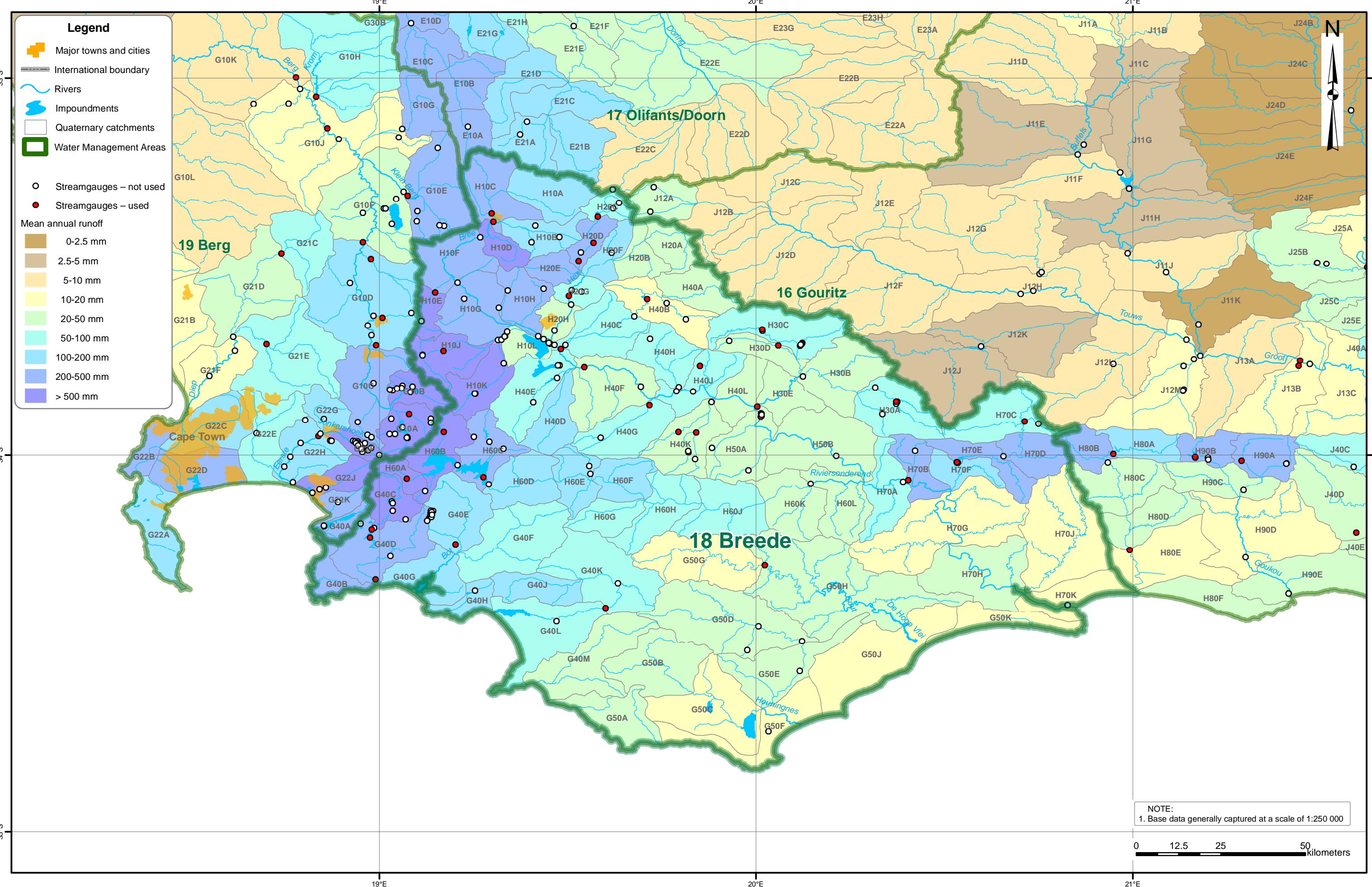


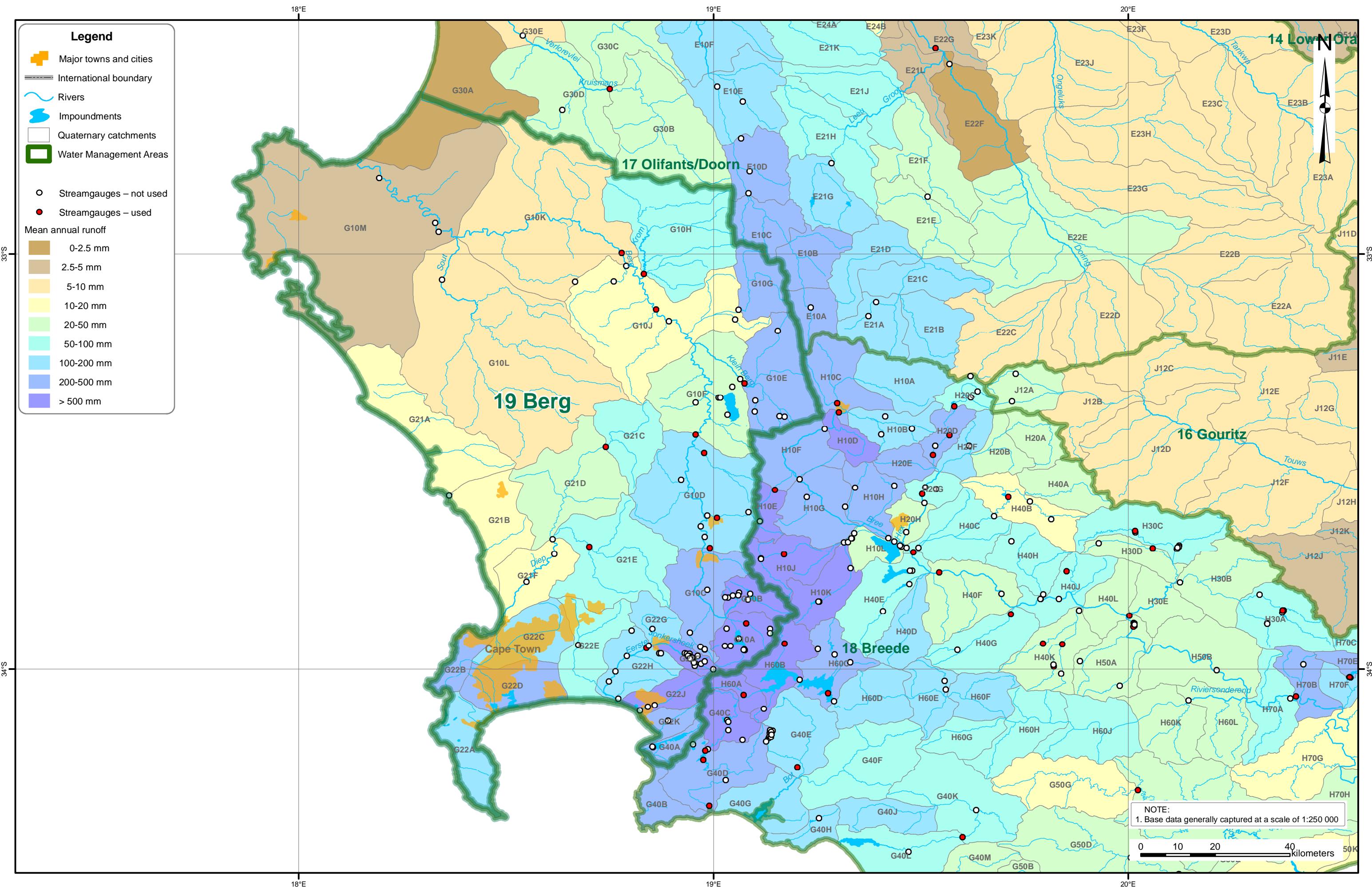


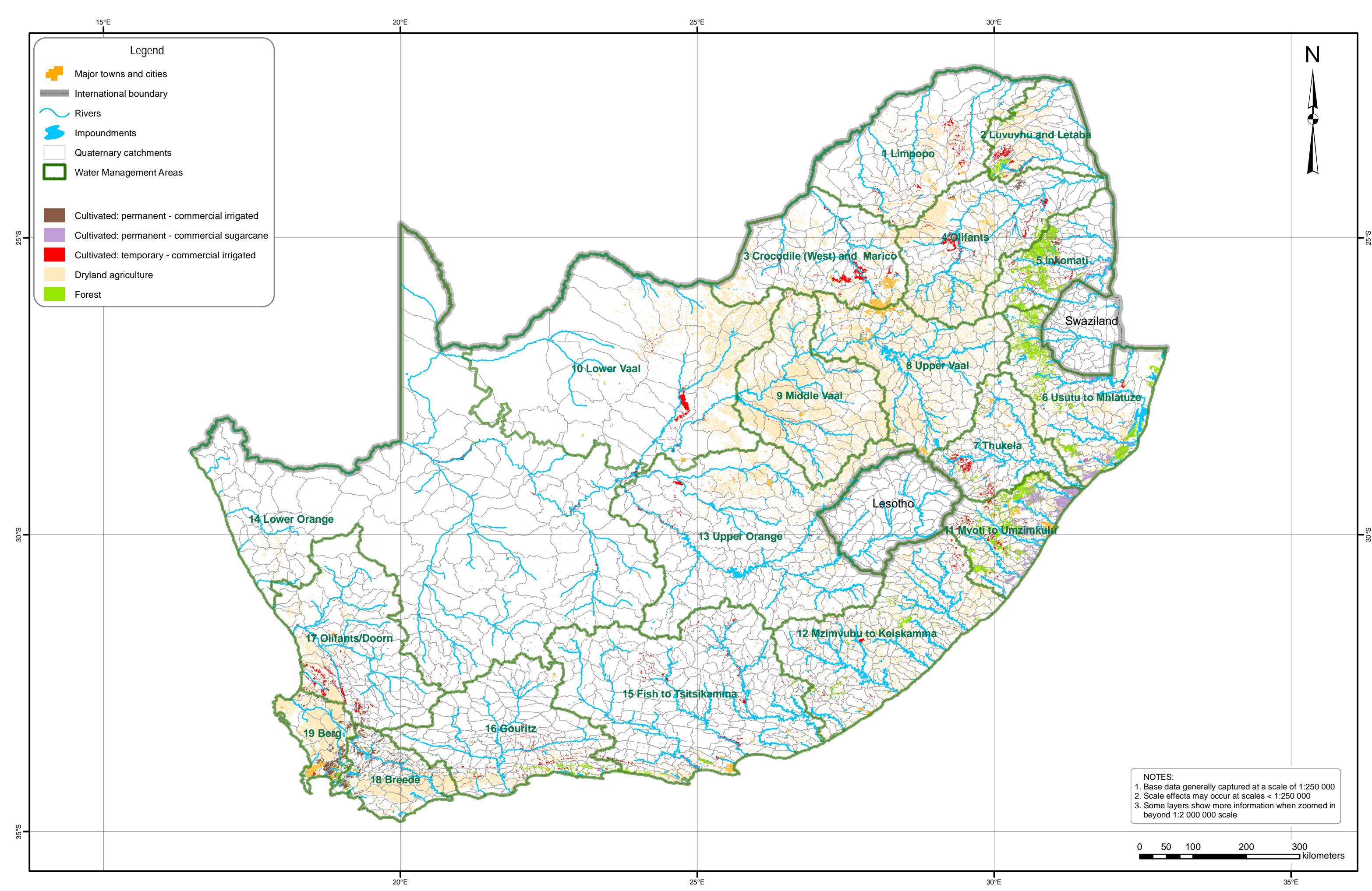


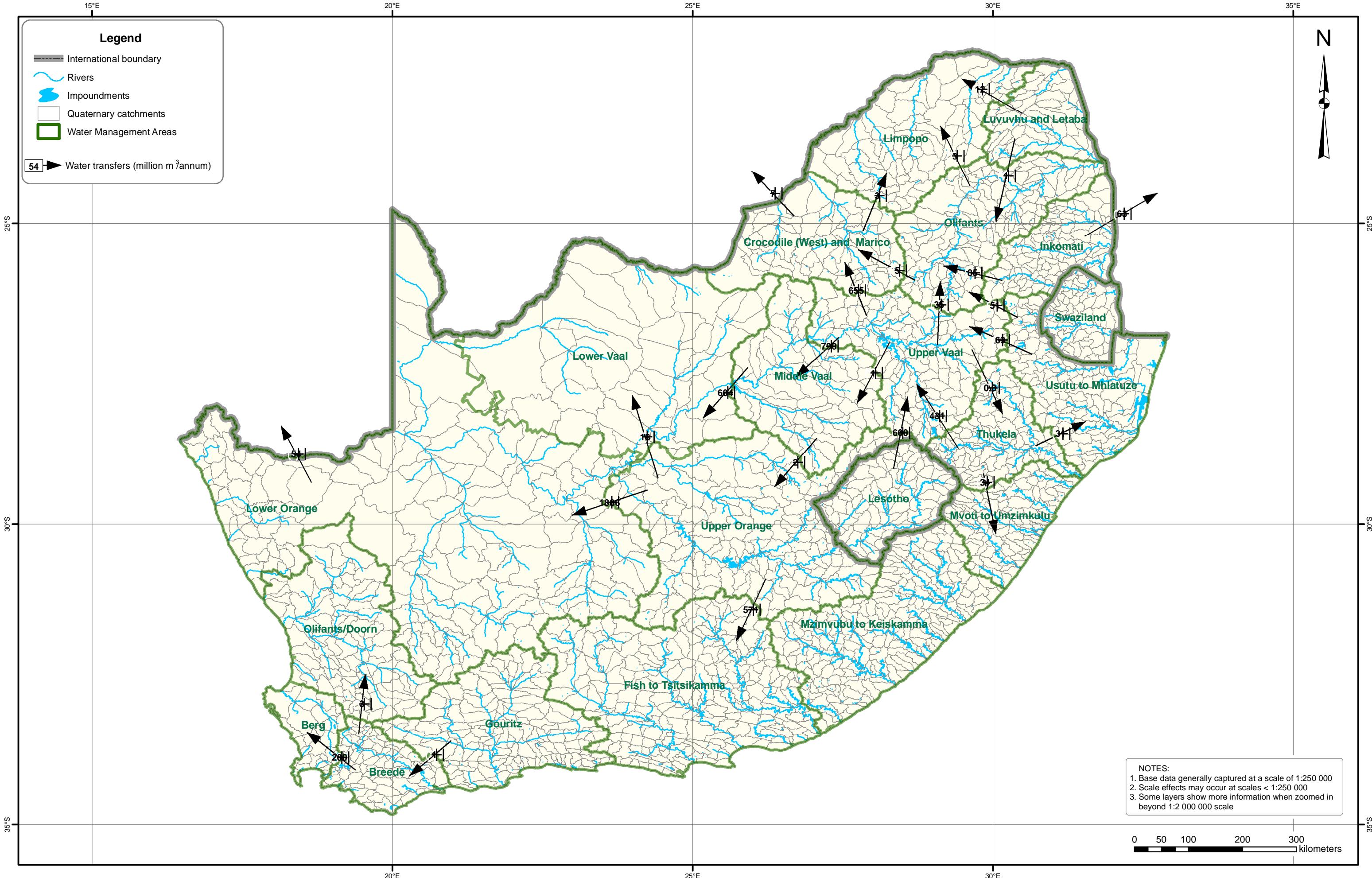


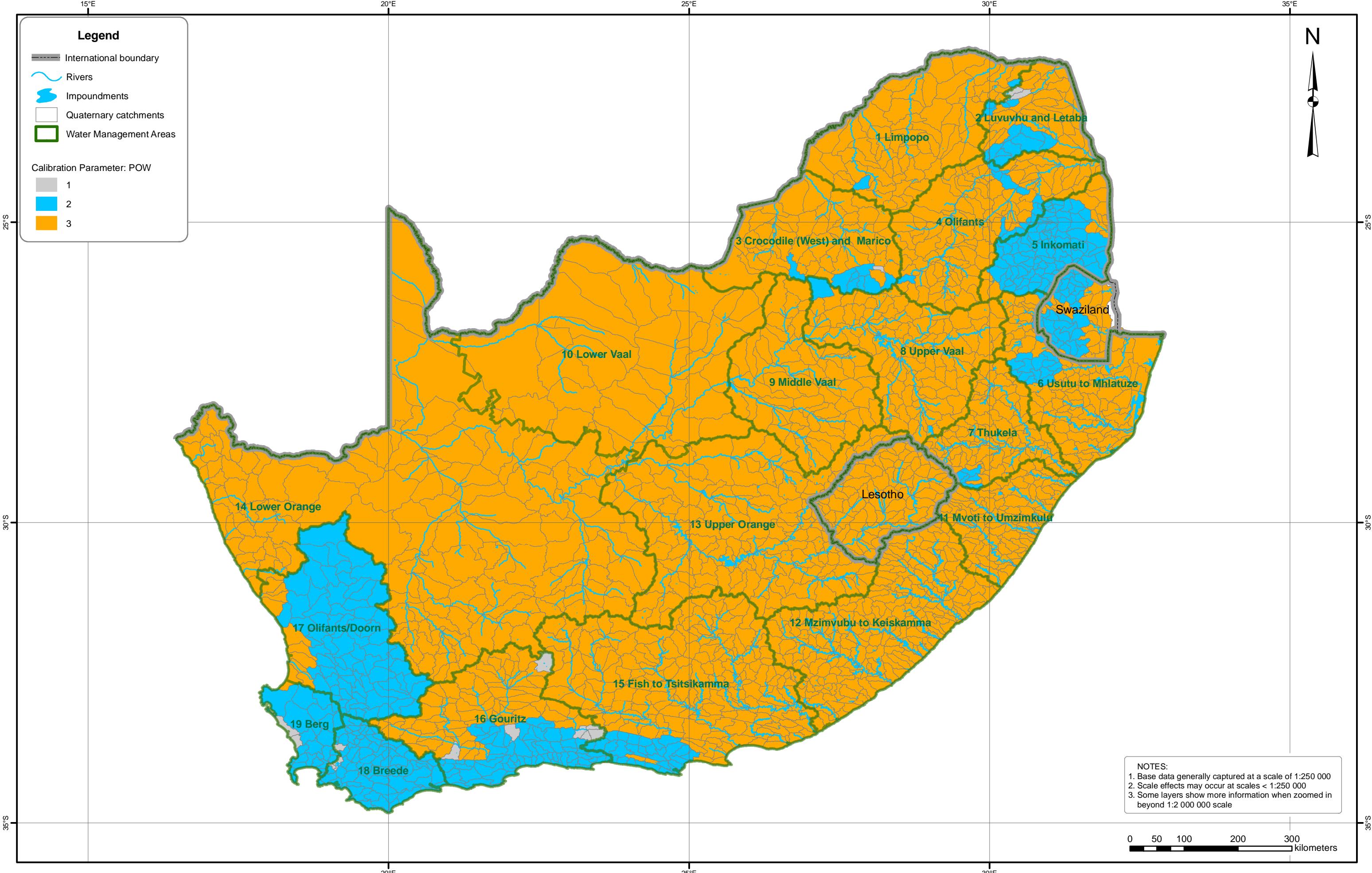


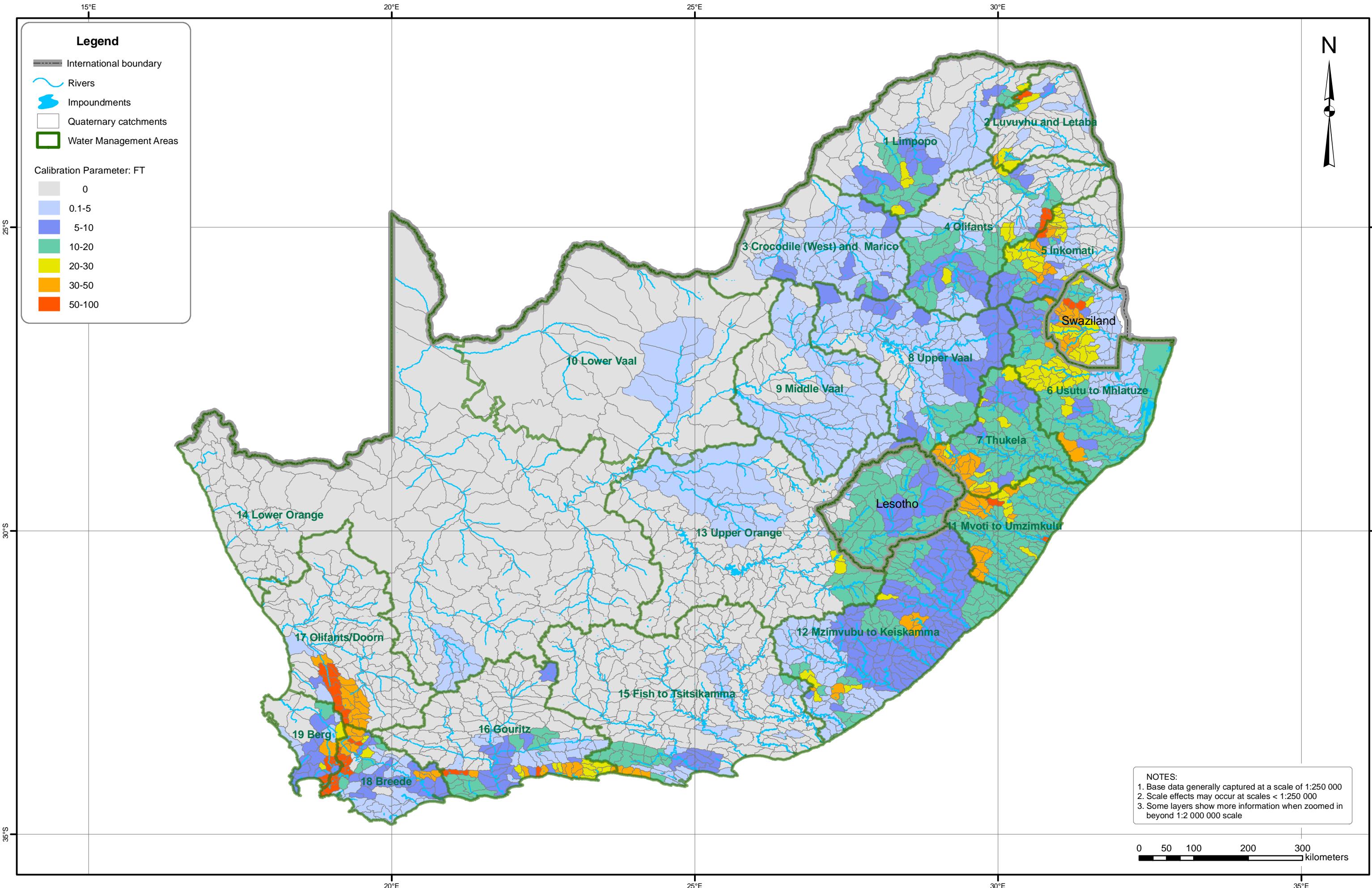


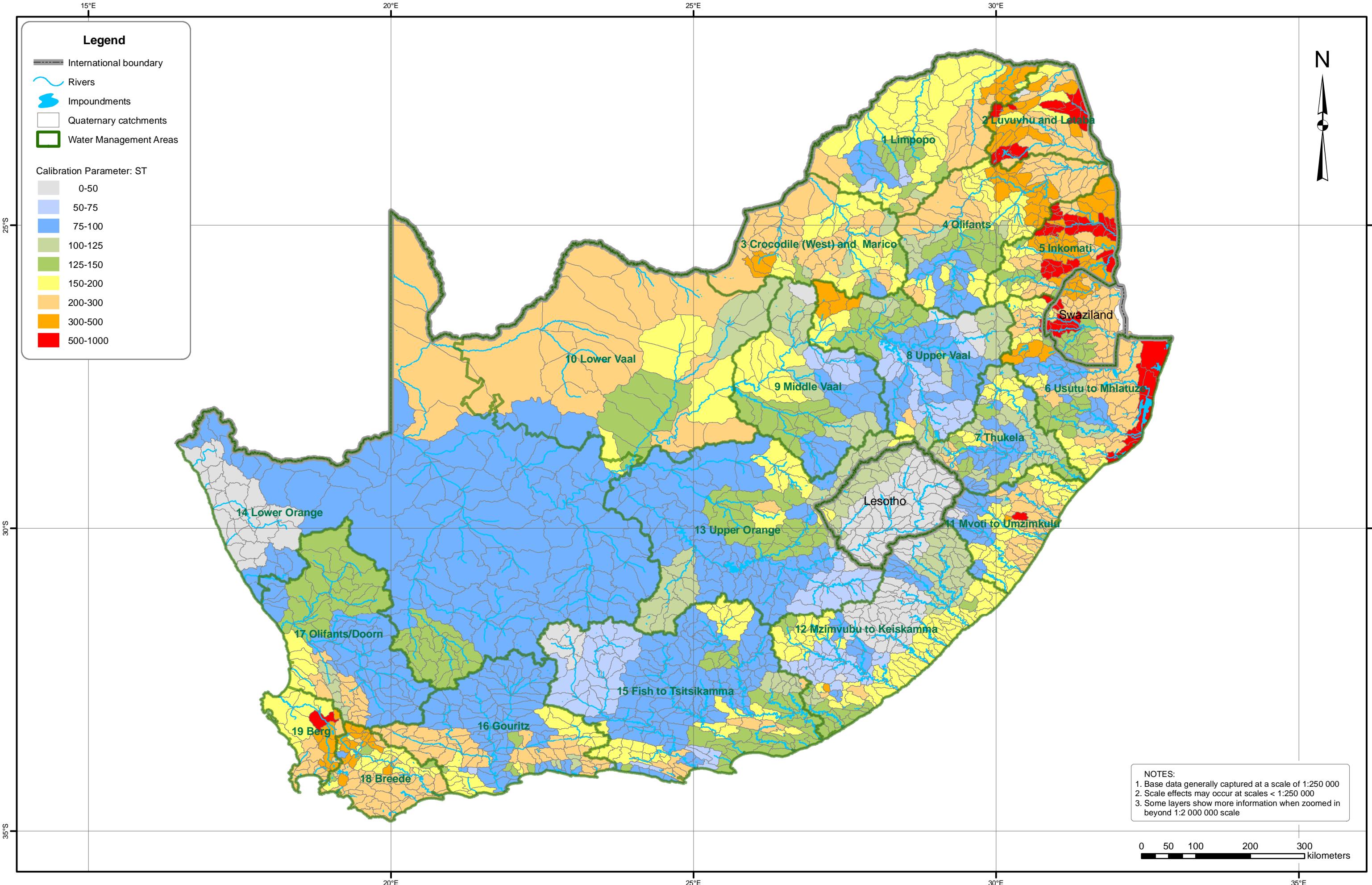


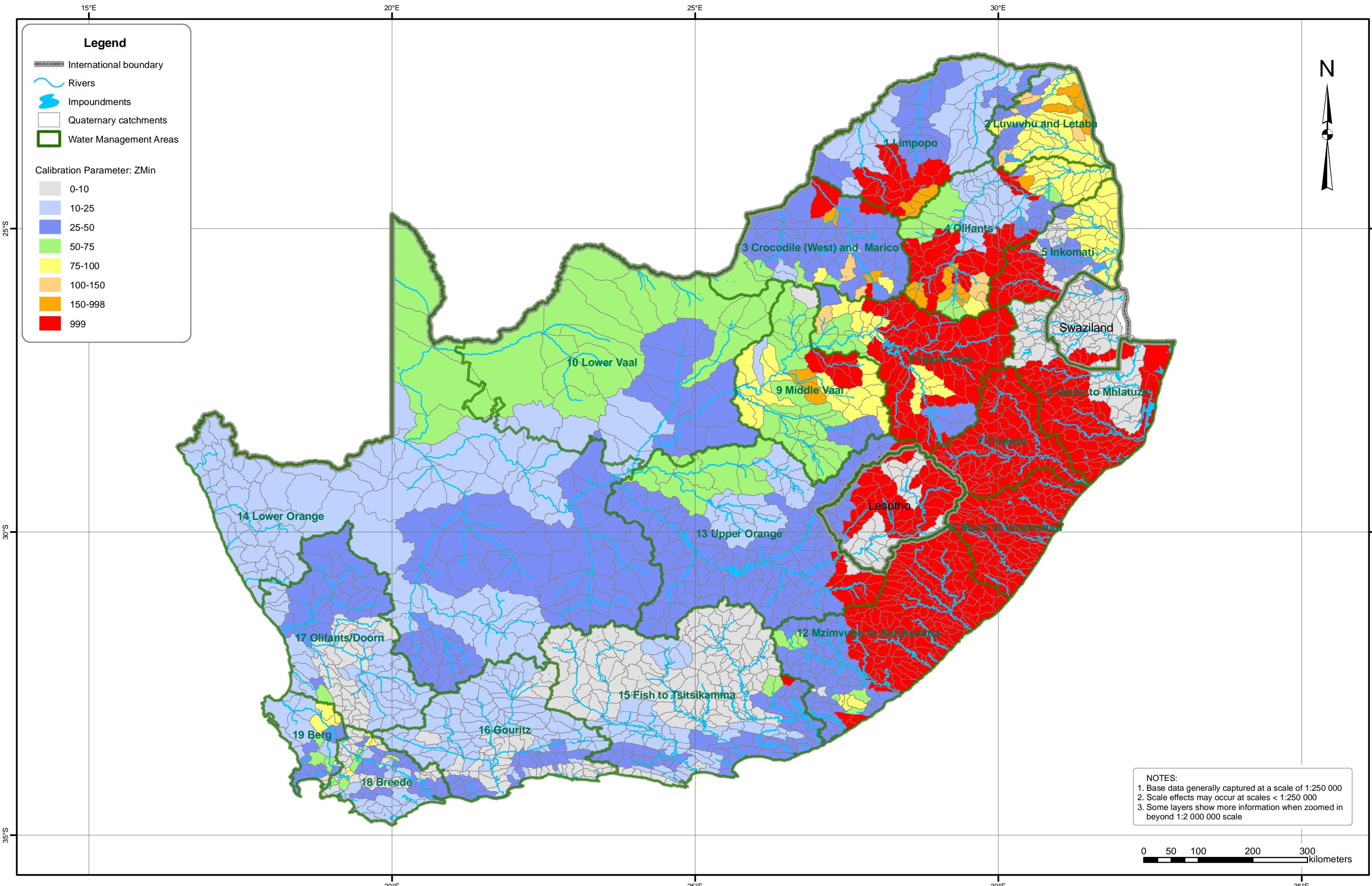


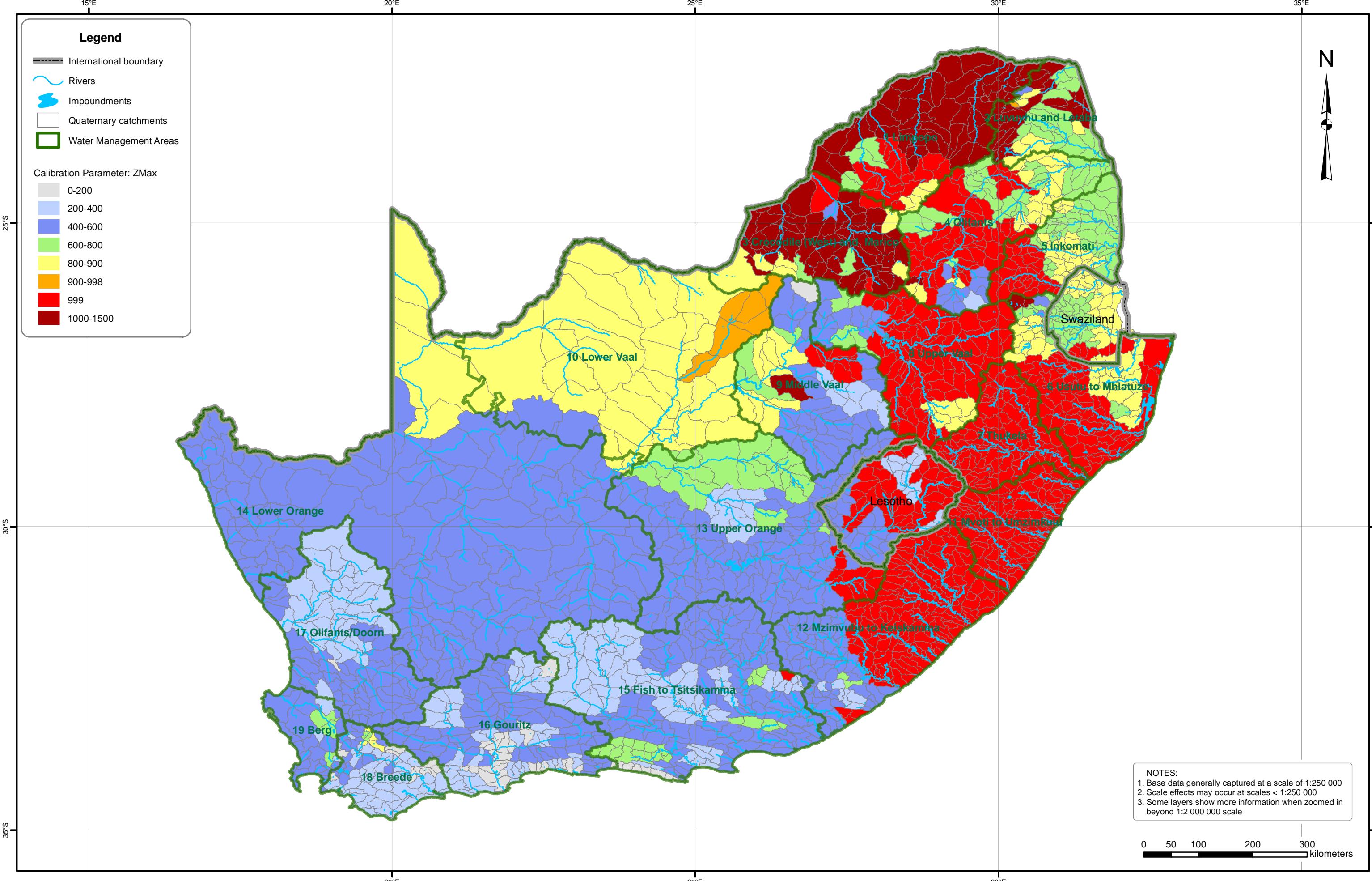


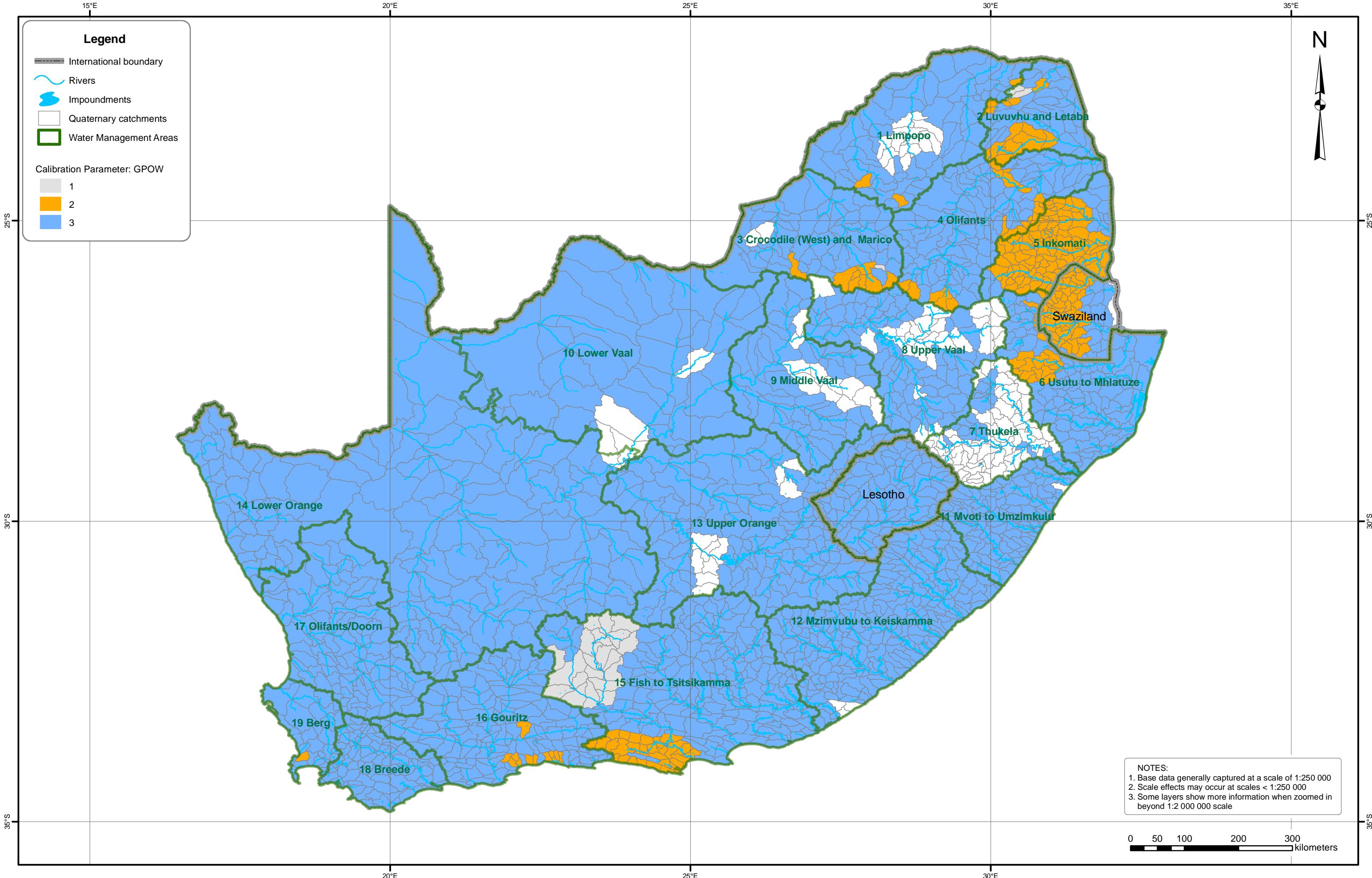


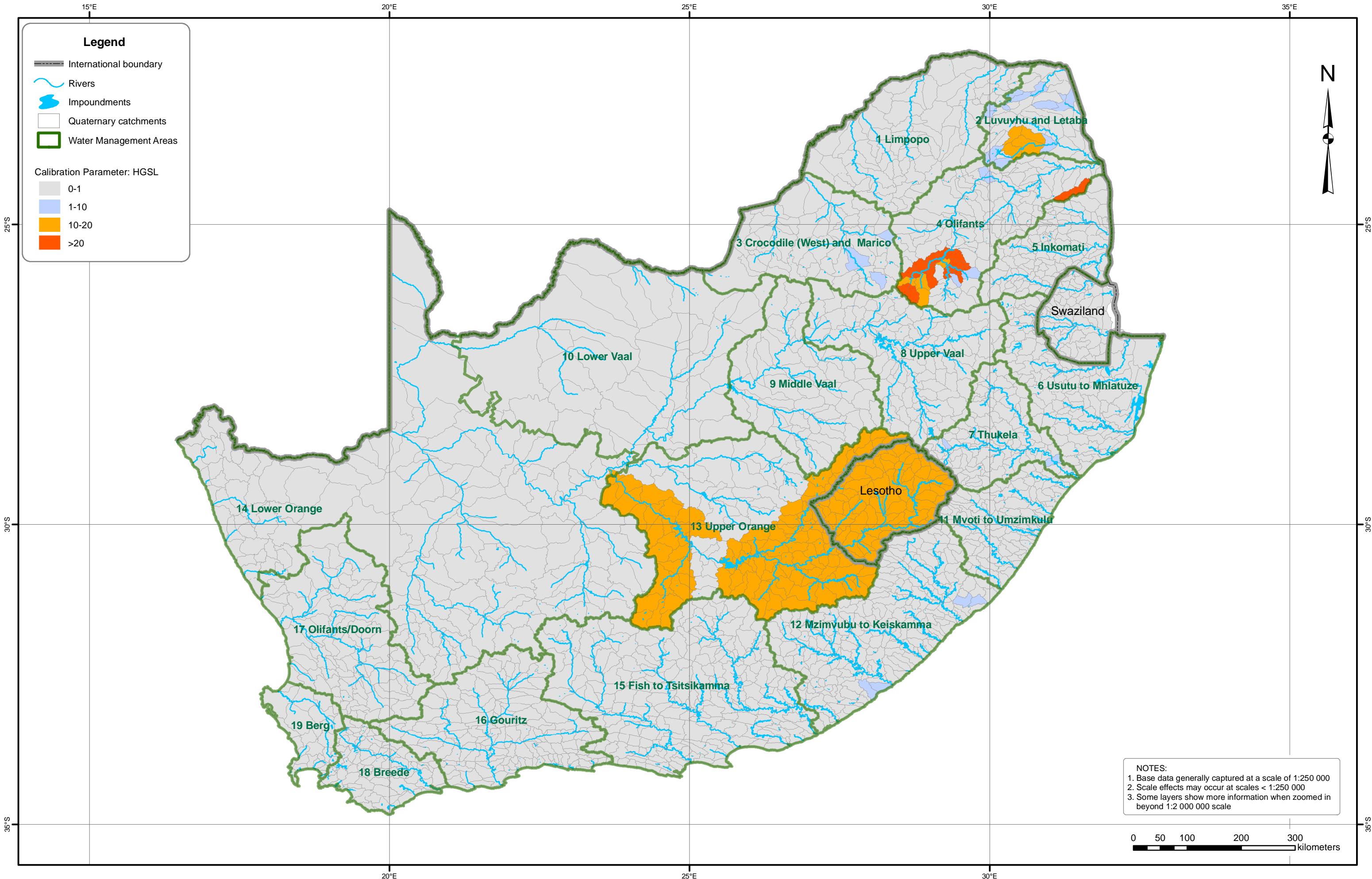


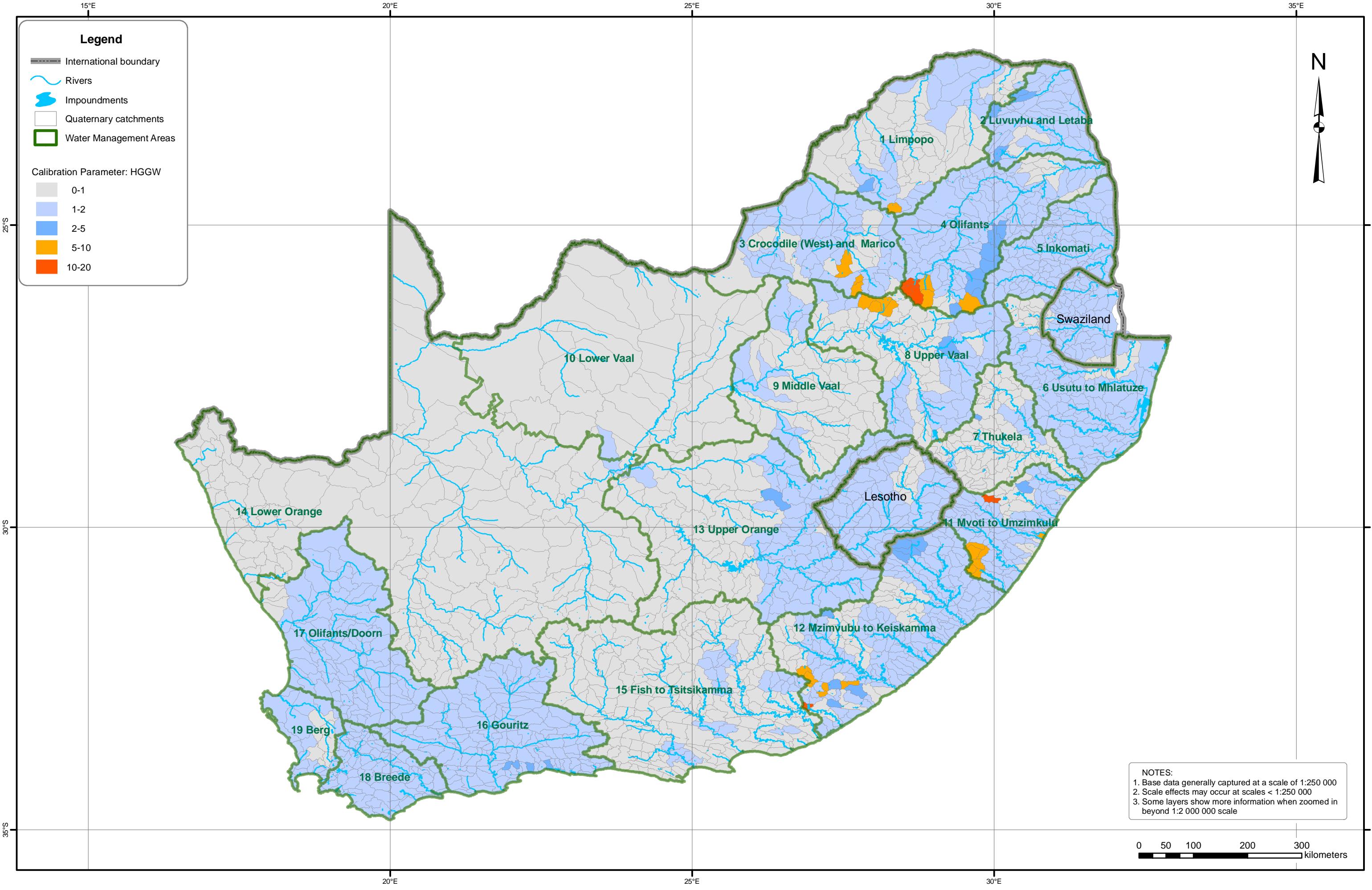


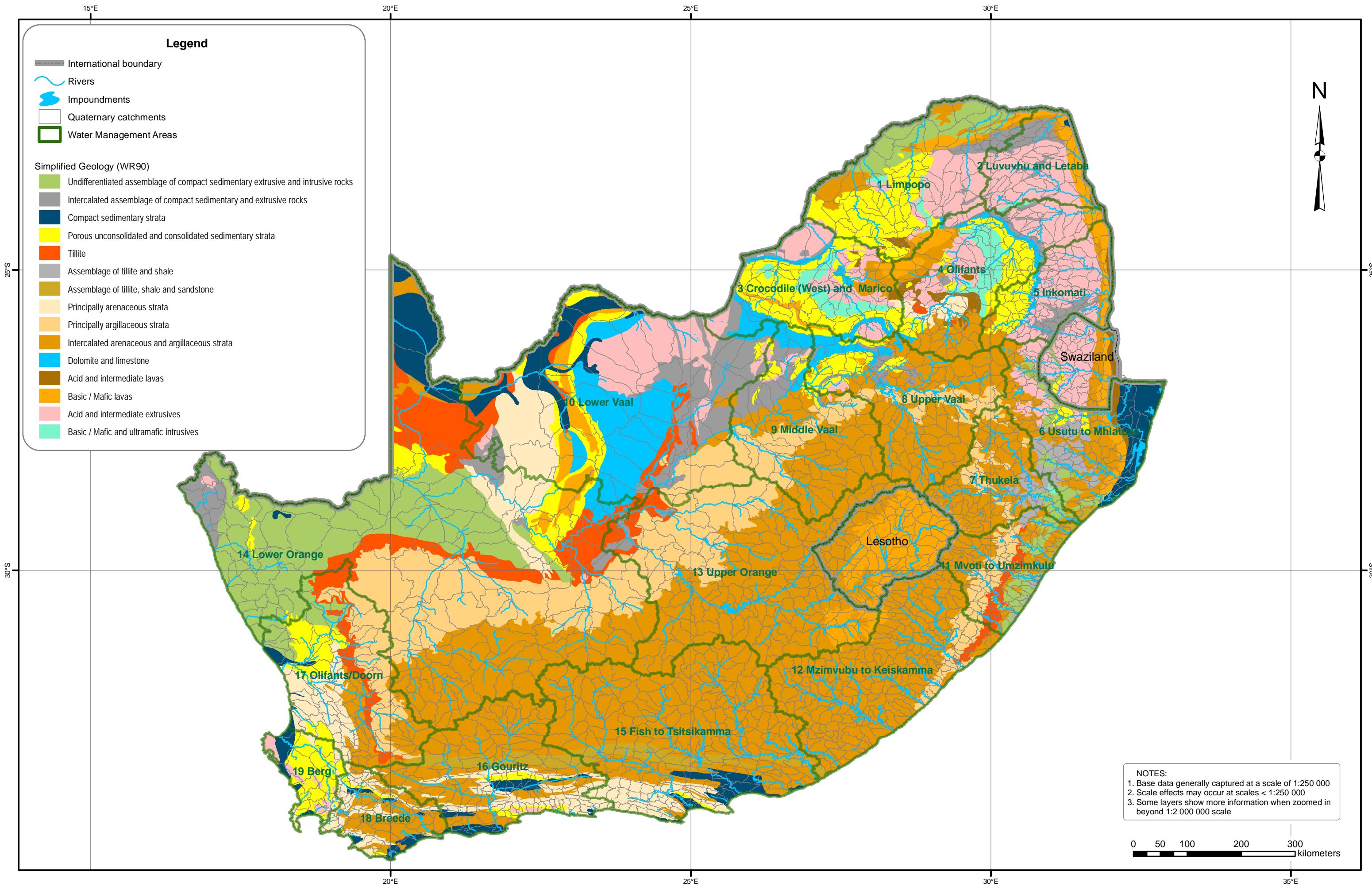


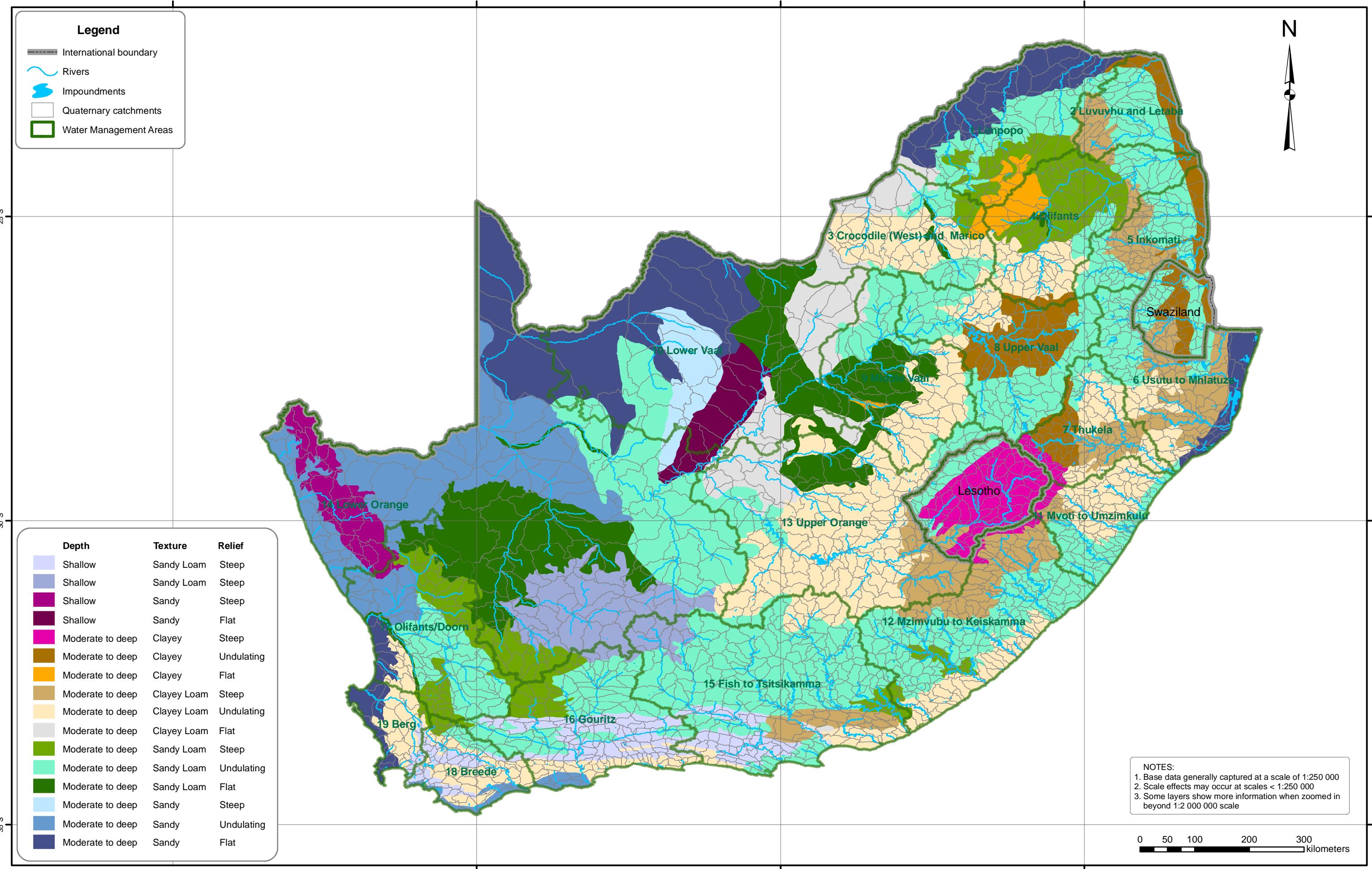


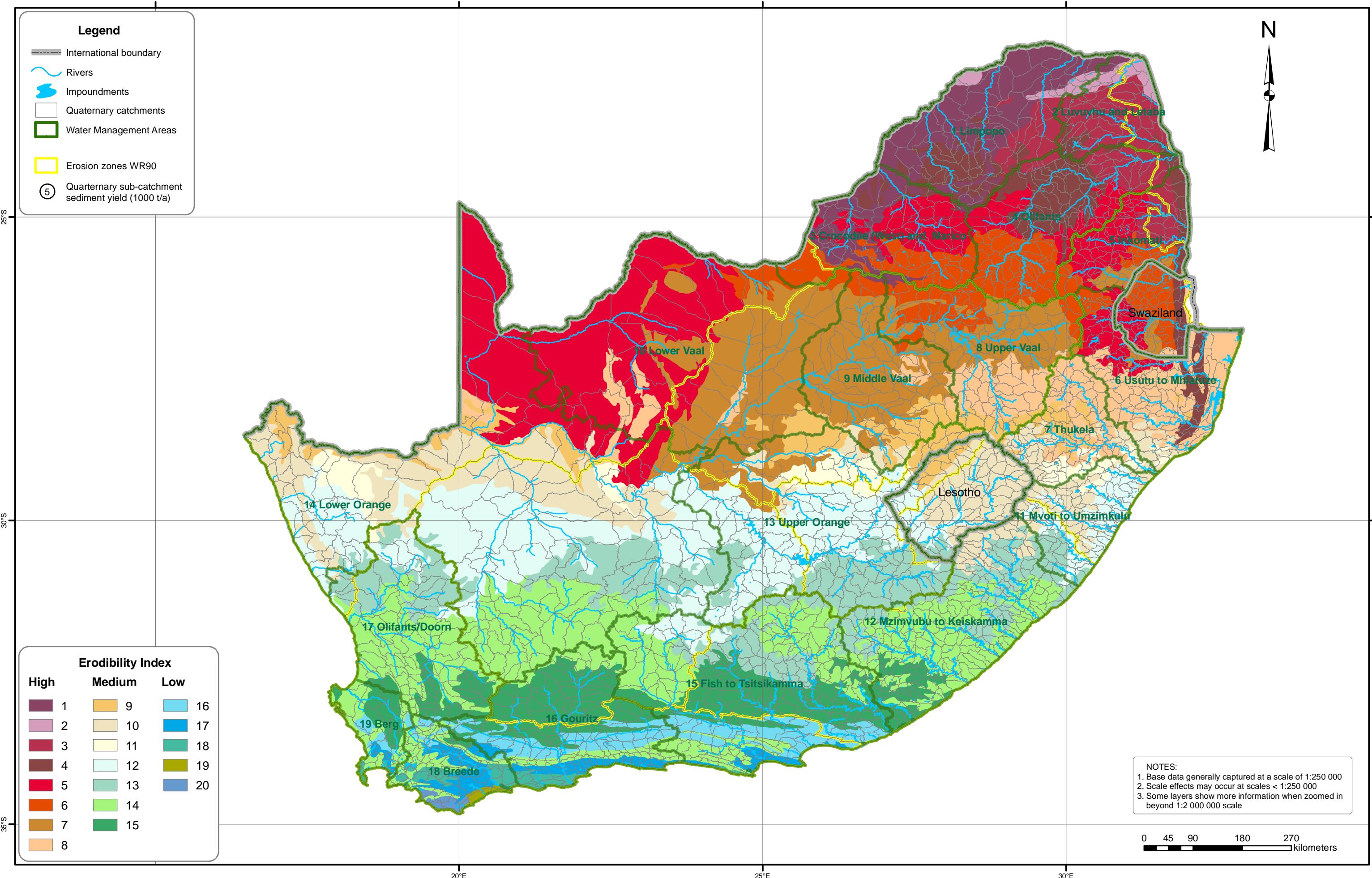


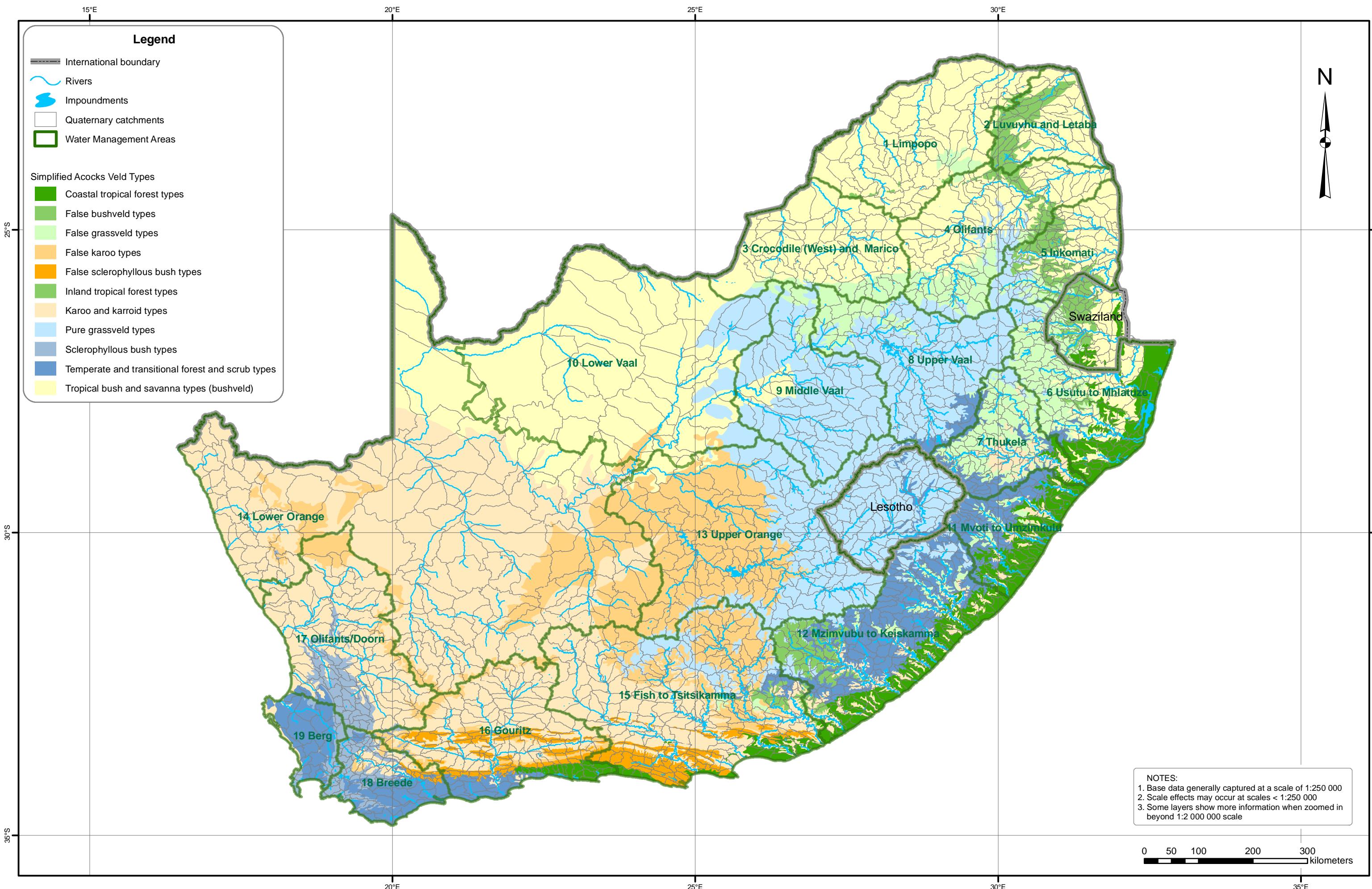


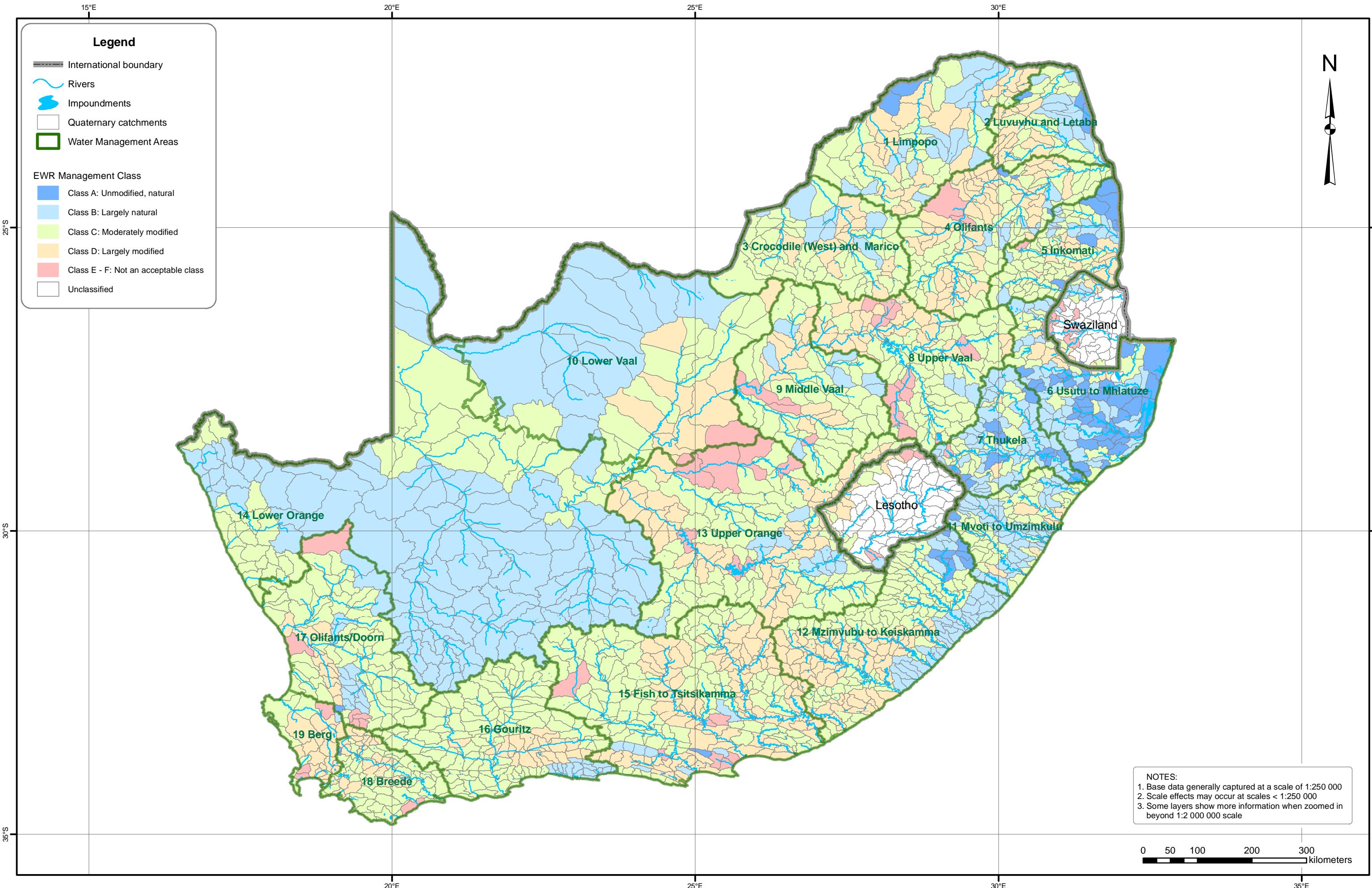


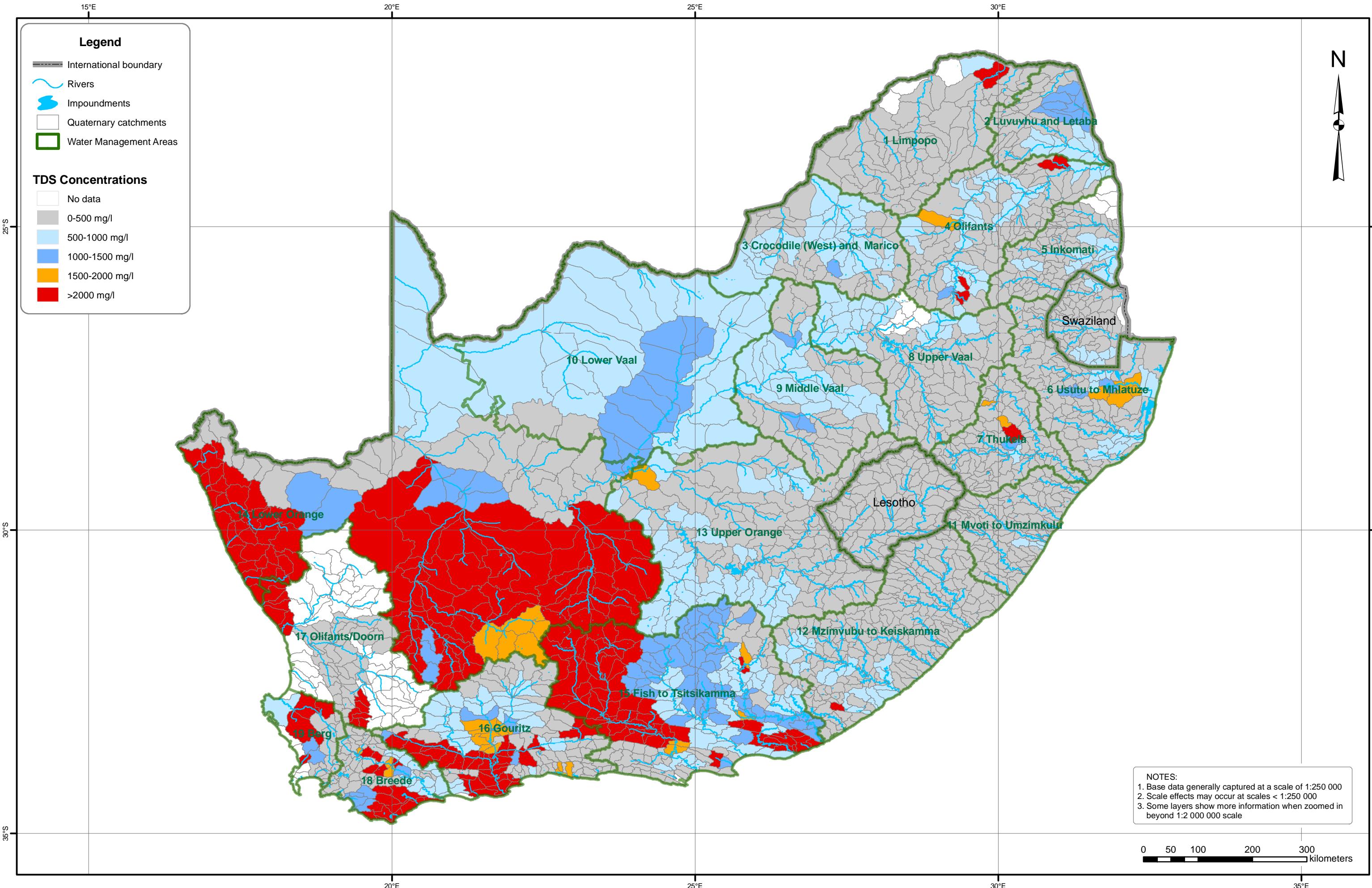


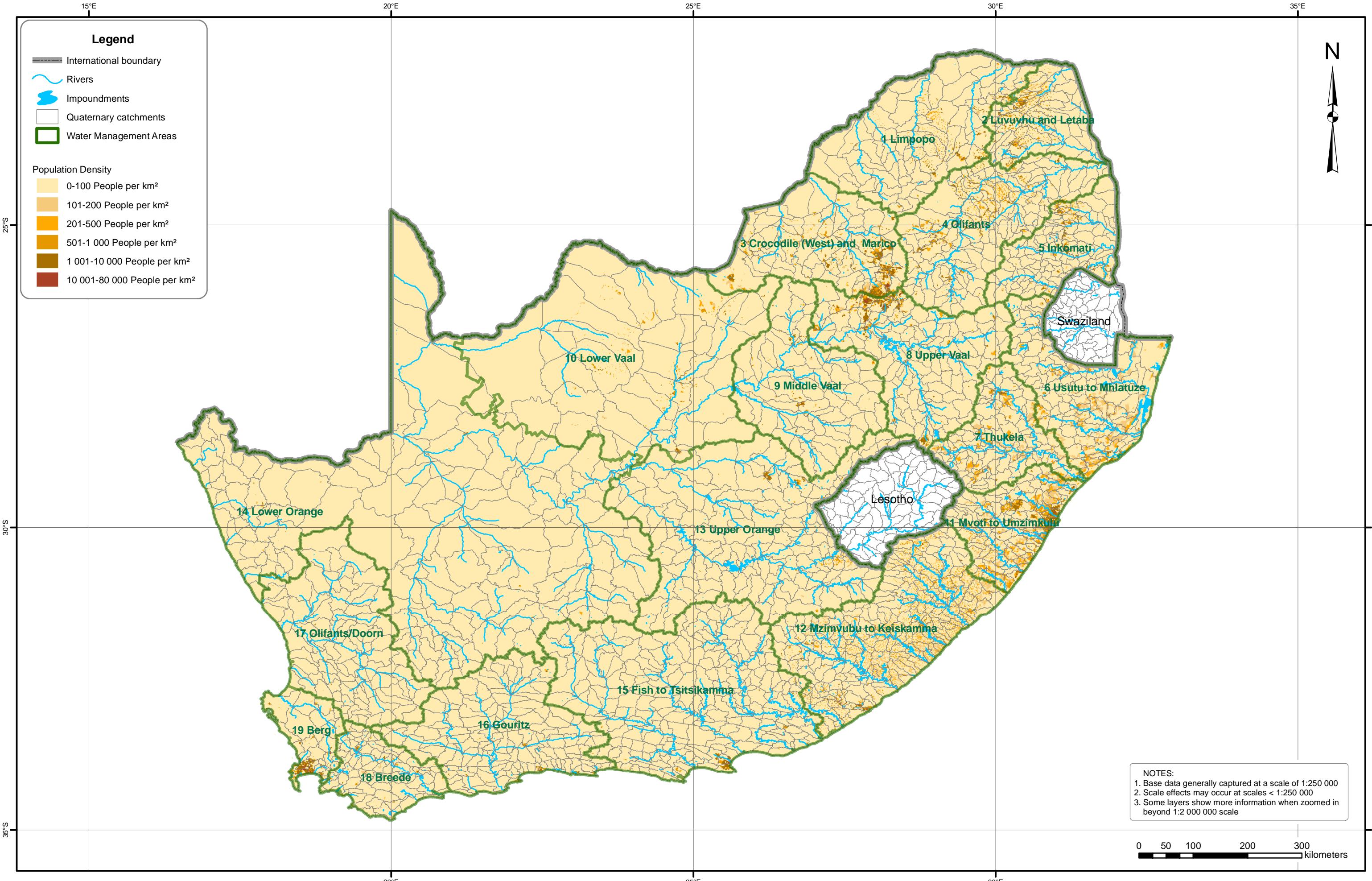








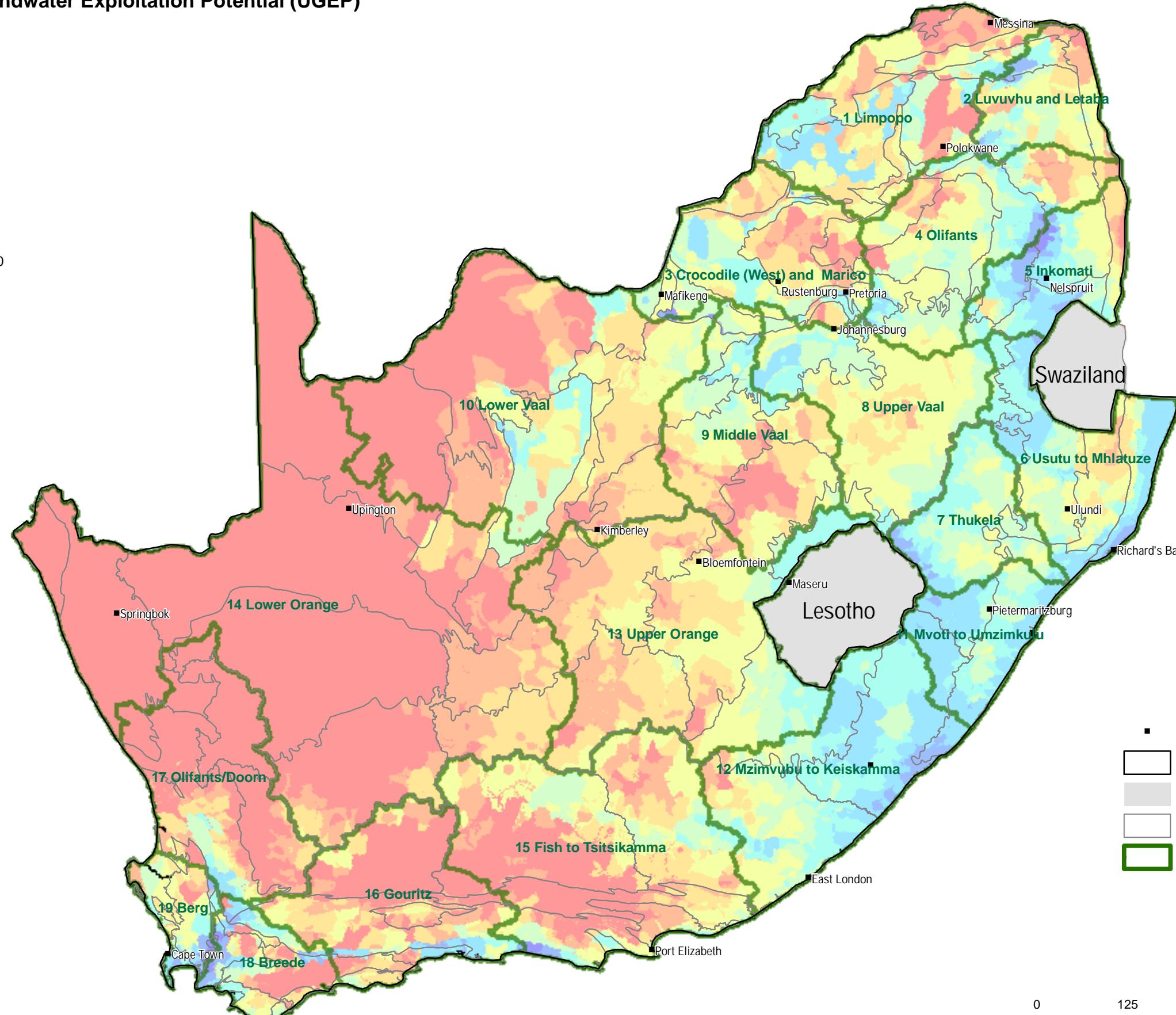




## Utilisable Groundwater Exploitation Potential (UGEP)

(m<sup>3</sup>/km<sup>2</sup>/a)

- < 2,500
- 2,501-4,000
- 4,001-6,000
- 6,001-10,000
- 10,001-15,000
- 15,001-25,000
- 25,001-50,000
- 50,001-100,000
- > 100,001



### Legend

- Cities
- South African National Boundary
- Lesotho & Swaziland
- Vegter's Groundwater Regions
- Water Management Areas

0 125 250 500 Kilometers

DATUM:  
WGS 84

PROJECTION:  
ALBERS

UTILISABLE GROUNDWATER EXPLOITATION POTENTIAL FOR SOUTH AFRICA  
DWAF GRA2 PROJECT (2005)

SCALE  
1:6,000,000

FIGURE No.  
13

## WR2005 Sources of Data

Map Figure Number	WR2005 Map	Description	Shp file name	Type	Main Attribute Information	Attribute Source	Coverage obtained from	Date of Source	Scale	Data capture agency	Method of capture	Coordinate projections	Custodian	Copyright restrictions
0	Basemap	Rivers	wriall500_primary.shp, wriall500_secondary.shp	Line	Name, class, order	DWAF	DWAF	2006	1:500 000	Surveys & Mapping	Digitised	GEO	DWAF	DWAF
		Selected Major Dams (Impoundments)	dams500g_wgs84.shp	Polygon	Name, type	DWAF	DWAF	2006	1:500 000	Surveys & Mapping	Digitised	GEO	DWAF	DWAF
		Towns	major towns and cities_poly.shp	Polygon	Name, label	DWAF	DWAF		1:250 000	Surveys & Mapping	Digitised	GEO	DWAF	DWAF
		Catchments	primary catchments.shp, secondary catchments SA.shp, dter.shp, catchments-sa.shp,	Polygon	primary, secondary, tertiary, quaternary	DWAF	DWAF	2002	1:50 000	DWAF	Digitised	GEO	DWAF	DWAF
		Water management areas	wma_dwaf.shp	Polygon	WATMAN, major_RIV	DWAF	DWAF	2003	1:50 000	DWAF	Digitised	GEO	DWAF	DWAF
		Endoreic Areas	erc.shp	Polygon	Erc_id	WR90	WR90	1995		WR90	Generated		WR90	None
1	Rainfall	South African Rainstations	rsa_rainst.shp	Point	ID, code, link, MAP	DWAF	DWAF	2006		DWAF	-	-	WR2005	WR2005
		Rain zones WR90	rain zones wr90.shp	Polygon	RAINZ, id	WR90	WR90	1995		WR90	Generated		WR90	None
		South African mean annual precipitation	rsa_map.shp	Polygon	MAP_mm	BEEH	Agri atlas	2000		BEEH	Generated	GEO	BEEH	BEEH
2a	Evaporation - WR90	Evaporation WR90	evaporation wr90.shp	Polygon	EIP, EIP_ID	WR90	WR90	1995		WR90	Generated		WR90	None
		Evaporation Stations	evapo stations wr90.shp	Point	Station name, Reference Number	WR90	WR90	1995		WR90	Generated		WR90	None
		Evaporation zones WR90	evapo zones wr90.shp	Polygon	EZN, EVAPZ	WR90	WR90	1995		WR90	Generated		WR90	None
2b	Evaporation Apan	Mean annual evaporation Apan	rsa_mae-apan.shp	Polygon	Grid code, evaporation	BEEH	Agri Atlas	2000		BEEH	Generated	GEO	BEEH	BEEH
3	Runoff	South African stream gauges	rsa_streamg.shp	Polygon	Station, shortname, mapname, start_obs, end_obs, region, consultant, used	DWAF	DWAF	2006		DWAF			WR2005	WR2005
		South African mean annual runoff	rsa_mar.shp	Polygon	RSA_MAR, CATNUM, MAR, curve, HYDROZ, colour	WR90	WR90	1995		WR90	Generated		WR90	None
4a	Landcover	Forest NLC 96	deforest-nlc96.shp	Polygon	FS_prov, code, symbol colour, description, land code, province	CSIR	DWAF	1995	1:250 000	CSIR	Raster	GEO	CSIR	CSIR
		Irrigated areas and sugarcane NLC 96	irrigation-nlc96.shp	Polygon	KZN_prov, code, symbol colour, description, land code, province	CSIR	DWAF	1995	1:250 000	CSIR	Raster	GEO	CSIR	CSIR
		Dryland agriculture NLC 96	dryland-nlc96.shp	Polygon	symbol colour, NP_prov, description, land code, province	CSIR	DWAF	1995	1:250 000	CSIR	Raster	GEO	CSIR	CSIR
4b	Water transfer	Water transfers	watertransline.shp	Line	Transfers, Volume	DWAF	DWAF	2000	1:250 000	DWAF	Digitised		DWAF	DWAF
5a-5h	Calibration	Calibration POW, ST, FT, ZMIN, ZMAX, GPOW, HGSL, HGG	rsa_calibration.shp	Polygon	Quaternery, primary, secondary, tertiary, POW, ST, FT, ZMIN, ZMAX, GPOW, HGSL, HGGW,	WR2005	WR2005	2008	-	WR2005	Generated	GEO	WR2005	None
6	Geology - simplified	Geology WR90	geology wr90.shp	Polygon	GEOL, colour, lithos	GeoScience	DWAF	1995	1:250 000	GeoScience	Derived	GEO	DWAF	DWAF
7	Soils	Soils WR90	soils wr90.shp	Polygon	SOI, SIRI_CDE, ASD, DST, DSS, RLF, DSERIES, DSSP, DSTEXTURE, DSTP, LOWPT, HIGHPT, range, class, colour	WR90	WR90	1989	1:250 000		Derived		WR90	None
8	Sediment	Erosion zones	erosion_zones_wr90.shp	Polygon	ERO, id and reg	WR90	WR90	1995	1:500 000	Univ of Stellenbosch	Digitised		WR90	None
		Sediment yield	sediment_yld_wr90.shp	Polygon	YLD, CATNUM, Frequency, Sum Yield, YLD 1000	WR90	WR90	1995	1:500 000	Univ of Stellenbosch	Digitised		WR90	None
		Erodibility	erodibility_wr90.shp	Polygon	Sediment, Grndklas, colour, erodibility	WR90	WR90	1995	1:500 000	Univ of Stellenbosch	Digitised		WR90	None
9	Vegetation	Vegetation WR90	vegetation wr90.shp	Polygon	VEG, types, Type description, colour	WR90	WR90	1995	:1 500 000	Dept of Agriculture		GEO	WR90	None
10	EWR	South African EWR values as per quaternary	rsa_ewr.shp	Polygon	Quaternary, primary, secondary, tertiary, rivers, EISC, PESC_desk,	DWAF	DWAF	2007	1:50 000	DWAF	Generated		DWAF	DWAF
11	TDS	South African Surface TDS values per quaternary	rsa_tds.shp	Polygon	Quaternary, primary, secondary, tertiary, TDS_p95, R	WR2005	WR2005	2008		WR2005	Generated		WR2005	None
12	Population	South African population density	rsa_popdensity.shp	Polygon	SP_code, SP_name, density	SSA	SSA	2001		SSA	Generated	GEO	SSA	SSA





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