

NORTHERN CAPE

LAND & WATER USE



TABLE 1
Areas and percentage change of land cover groups between 1990 and 2013/14.

Land cover group	1990 Area (km²)	2013-14 Area (km²)	Change (%)
Waterbodies (WB)	1000	404	-0.210
Wetlands (WTL)	948	351	-0.211
Indigenous Forest (INF)	0	0	0
Thicket / Dense bush (TDB)	2277	1778	-0.176
Woodland / Open bush (WOB)	5450	8338	1.020
Grassland (GRS)	5991	15087	3.211
Low shrubland (LSB)	183582	172829	-3.797
Mines (MNS)	773	758	-0.005
Bare non-vegetated (BNV)	70183	73564	1.194
Plantations / Woodlots (PWD)	11	7	-0.001
Cultivated commercial annuals (CCA)	1613	1745	0.047
Cultivated perennial (CPE)	263	298	0.012
Cultivated subsistence (CSB)	33	30	-0.001
Low shrubland (LSB)	10745	7620	-1.103
Urban	340	401	0.022

WARMS DATABASE (updated up to August 2016) (Lower Vaal and Lower Orange)

The highest water use volumes were registered in the Lower Vaal and Lower Orange for taking water, storing water, disposing waste, removing groundwater and irrigation with wastewater.

Low water withdrawals and storage were recorded in the Lower Vaal covering a smaller area. Water taking was largely from schemes (both areas) and boreholes (Lower Vaal).

There are no records of afforestation and discharging wastewater in the Lower Orange.

The highest water withdrawals per sector are from **agricultural irrigation (76.3% and 92.3%), followed by water supply services, mining and urban industry.**

NATIONAL LAND COVER (NLC) MAPS of 1990 & 2013/14:

The main changes in land cover between 1990 and 2013/14 occurred for grassland (+3.211%), bare non-vegetated land (+1.194%) and woodland/open bush (+1.020) at the expense of low shrubland (-3.797%) and fynbos (-1.103%) (Table 1).

The largest areas in the Northern Cape are covered by **low shrubland (172,829 km²) and bare non-vegetated land (73,564 km²)** (Figure 1). No indigenous forest occurs in the Northern Cape.

ETLOOK ANNUAL EVAPOTRANSPIRATION (ET) DATA (from August 2014 to July 2015):

ET is largely low with an increasing gradient from west to east depending on rainfall patterns (Figure 2).

Median annual water use per unit area was generally low across the province with the highest water use being from cultivated perennials (643 mm a⁻¹) and the lowest from bare non-vegetated land (25 mm a⁻¹) (Table 2).

In absolute terms, by far the **largest water use was from low shrubland (28,916 Mm³ a⁻¹)** that covers by far the largest area.

FIGURE 1
Land cover groups based on the National Land Cover (NLC) map of 2013/14 for the Northern Cape.

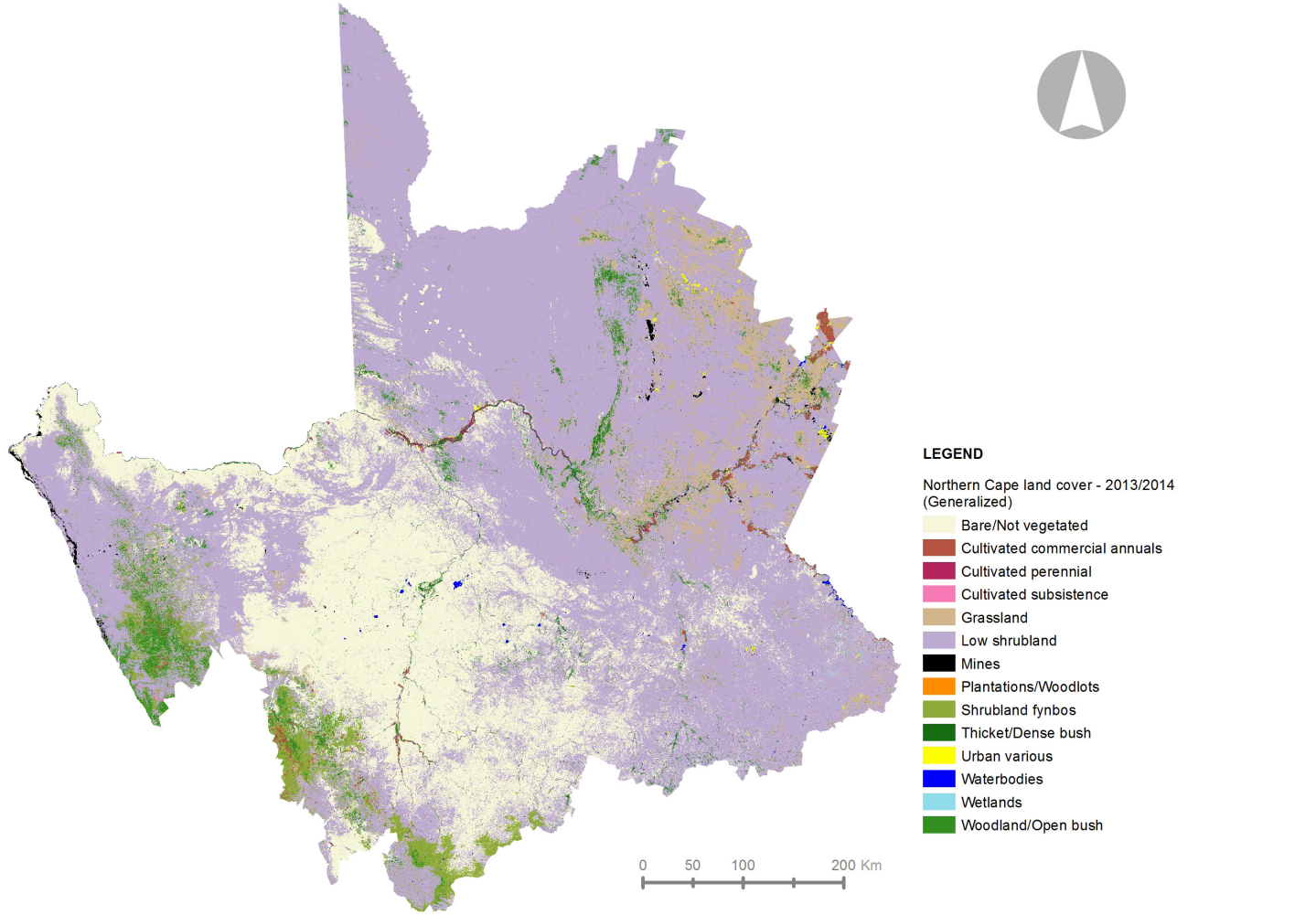


FIGURE 2
Annual ETLook evapotranspiration (ET) in 2014/15 for the Northern Cape.

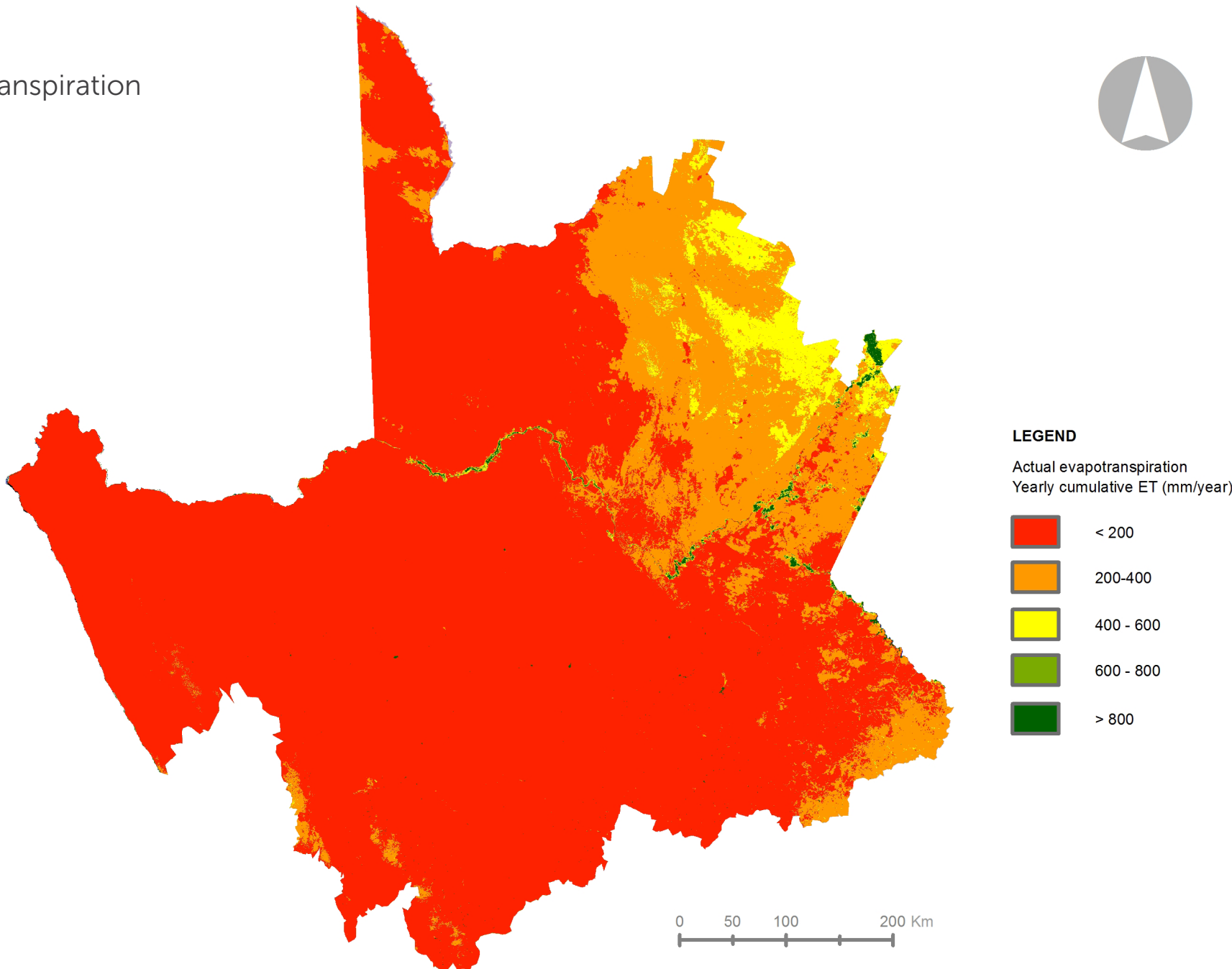


TABLE 2
Water use statistics for land cover groups based on annual ETLook data in 2014/15 for the Northern Cape.

Land use	Water use statistics						CUM (Mm³ a ⁻¹)
	MEAN mm (a ⁻¹)	MEDIAN (mm a ⁻¹)	MIN (mm a ⁻¹)	MAX (mm a ⁻¹)	STD (mm a ⁻¹)	AREA (km²)	
Waterbodies (WB)	1100	391	2	3014	1110	503	197
Wetlands (WTL)	281	223	7	2585	295	457	102
Indigenous Forest (INF)	-	-	-	-	-	-	-
Thicket / Dense bush (TDB)	253	148	2	2765	361	2265	336
Woodland / Open bush (WOB)	151	112	2	2732	143	10725	1198
Grassland (GRS)	269	254	2	2765	141	18242	4625
Shrubland fynbos (SHF)	110	98	2	2461	72	9836	963
Low shrubland (LSB)	147	131	2	2740	98	220089	28918
Cultivated commercial annuals (CCA)	477	334	5	2703	411	2287	765
Cultivated perennial (CPE)	666	643	7	2765	404	394	253
Cultivated subsistence (CSB)	100	99	19	1042	39	38	4
Cultivated cane (CC)	-	-	-	-	-	-	-
Plantations / Woodlots (PWD)	331	305	12	2380	218	9	3
Mines (MNS)	125	99	2	2579	134	977	96
Bare non-vegetated (BNV)	36	25	2	3014	51	95868	2378
Urban industrial (UIND)	215	216	5	2578	135	21	4
Urban commercial (UC)	191	176	5	976	141	18	3
Urban residential (UR)	161	159	6	859	98	111	18
Urban sport and recreation (ORS)	250	262	4	2672	158	73	19
Urban informal (UINF)	243	196	6	2379	203	35	7
Urban Others (UO)	217	210	16	2672	171	72	15

FIGURE 3
Daily average air temperatures for different land covers in the Northern Cape based on NASA/GMAO Modern Era Retrospective Analysis (MERRA) from 2000 to 2012.

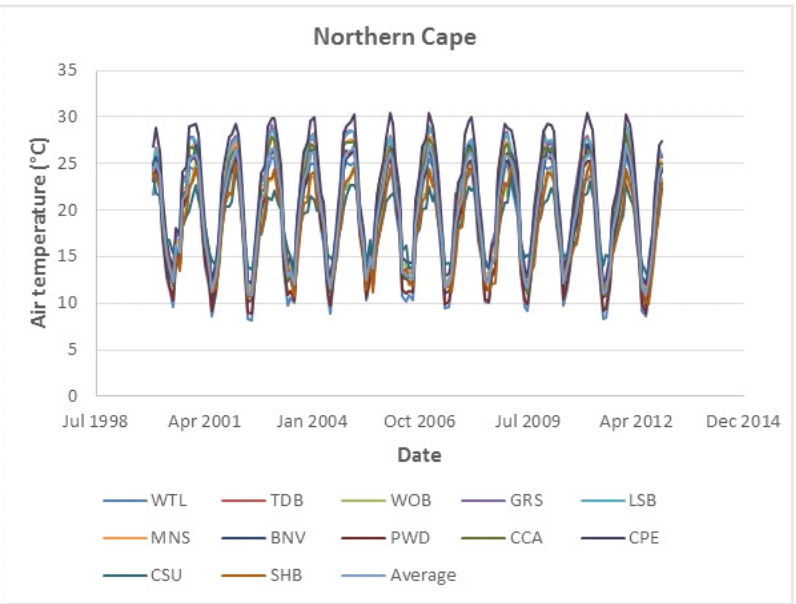
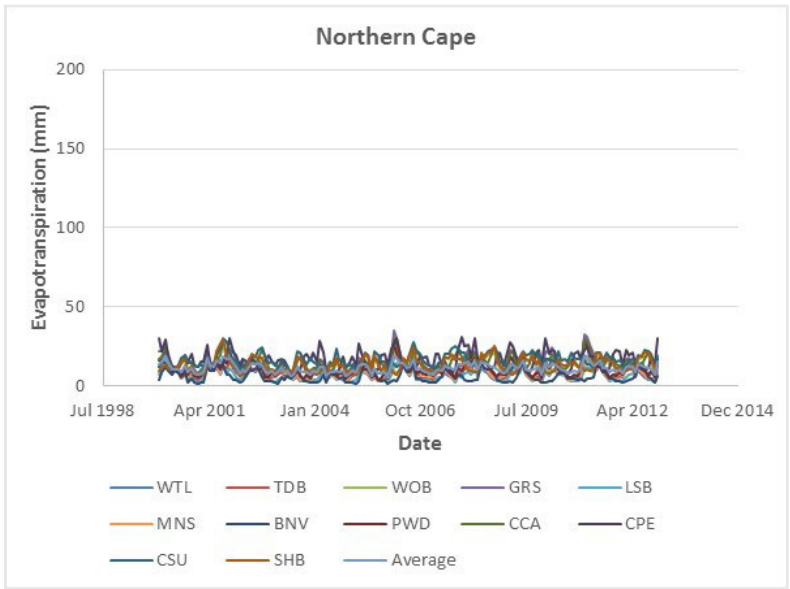


FIGURE 5
Monthly MOD16 evapotranspiration for different land cover groups in the Northern Cape from 2000 to 2012.



MOD16 MONTHLY EVAPOTRANSPIRATION (ET) DATA (FROM 2000 TO 2012)

- The Northern Cape is the hottest province with daily average air temperatures ranging from about 10°C to 30°C (Figure 3).
- The Northern Cape is the driest province with monthly rainfall showing spatial variability and peaks usually below 150 mm month⁻¹ occurring during summer months (Figure 4).
- Due to dry conditions, MOD16 ET is very low ranging from being negligible to about 30 mm month⁻¹ (Figure 5).

GUIDELINES AND RECOMMENDATIONS

- Incentivizing smart farming practices may reduce the volumes used in agriculture and the burden on water resources.
- Removing underground water and disposing waste are substantial water uses due to mining activities, especially in the Lower Vaal. It is recommended that mining houses try and remediate wastewater and re-use it for irrigation and power generation in close vicinity to the waste generating streams. The existing pool of wastewater streams can potentially become a valuable water-reuse source (currently less than 0.2% of water abstracted is re-used for wastewater irrigation).
- There is potential for increasing groundwater use and conjunctive use of surface water and groundwater.
- Rural unregistered users may impact the results more than urban activities as these may have never been accounted for.
- Given low rainfall is the main driver of ET, trade-offs in land use will not bring substantial benefits in water saving. However, conservation efforts are required to reduce the loss of low shrubland and fynbos and desertification (increase in bare non-vegetated land).

ACKNOWLEDGMENTS AND SOURCES OF INFORMATION:
Water Authorisation and Registration Management System (WARMS)
National Land Cover (NLC) maps for 1990 and 2013/14
Satellite-derived images and products (ETLook and MOD16 evapotranspiration)
Ground measurements of climatic variables (SAWS)
NASA/GMAO Modern Era Retrospective Analysis (MERRA)