

LIMPOPO

LAND & WATER USE



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

Land cover group	1990 Area (km²)	2013-14 Area (km²)	Change (%)
Waterbodies (WB)	114	143	0.031
Wetlands (WTL)	578	342	-0.260
Indigenous Forest (INF)	285	332	0.052
Thicket / Dense bush (TDB)	12242	12628	0.423
Woodland / Open bush (WOB)	38796	45238	7.083
Grassland (GRS)	23562	14295	-10.189
Low shrubland (LSB)	2130	4306	2.393
Mines (MNS)	206	210	0.004
Bare non-vegetated (BNV)	69	520	0.496
Plantations / Woodlots (PWD)	740	564	-0.194
Cultivated commercial annuals (CCA)	5746	5359	-0.426
Cultivated perennial (CPE)	562	789	0.249
Cultivated subsistence (CSB)	3365	2928	-0.481
Low shrubland (LSB)	0	0	0.000
Urban	2558	3302	0.818

WARMS DATABASE (updated up to August 2016)

Most water volumes are registered in Limpopo for taking water (1.25 billion m³ a⁻¹), for storing water (0.53 billion m3), disposal of waste (0.44 billion m³ a⁻¹) and afforestation (0.04 billion m³ a⁻¹).

By water resource types, water is taken mainly from boreholes (35.4%), rivers/streams (27.7%), schemes (25.5%) and dams (10.2%).

The highest water withdrawals per sector were for agricultural irrigation (1.04 billion m³ a⁻¹ or 83.1% of the total), water supply services (0.11 billion m³ a⁻¹ or 8.6%), mining and power generation (0.03 billion m³ a⁻¹ each or 2.4%).

Limpopo had the **third highest registered water volume reductions from afforestation** of all provinces, the highest borehole water usage and the highest water use for power generation.

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

The main changes in land cover between 1990 and 2013/14 occurred for woodland/open bush (+7.083%) and low shrubland (+2.393%) encroaching mainly grassland (~10.189%) (Table 1).

The largest areas in Limpopo are covered by **woodland/open bush (45,238 km²), grassland (14,295 km²) and thicket/dense bush (12,628 km²) (Figure 1).**

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

ET displays extreme variations depending on the geographical position in the Highveld, escarpment or Lowveld (Figure 2).

Besides waterbodies, the highest median annual water use per unit area was from plantations/ woodlots (1156 mm a⁻¹), indigenous forests (1117 mm a⁻¹) and cultivated perennials (998 mm a⁻¹) located mainly in high rainfall areas on the escarpment, and the lowest from mines (346 mm a⁻¹) (Table 2).

In absolute terms, the largest water use was from **woodland/open bush (30,228 Mm³ a⁻¹), thicket/dense bush (10,265 Mm³ a⁻¹) and grassland (9,428 Mm³ a⁻¹)** that cover the largest areas.

FIGURE 1

Land cover groups based on the National Land Cover (NLC) map of 2013/14 for Limpopo.

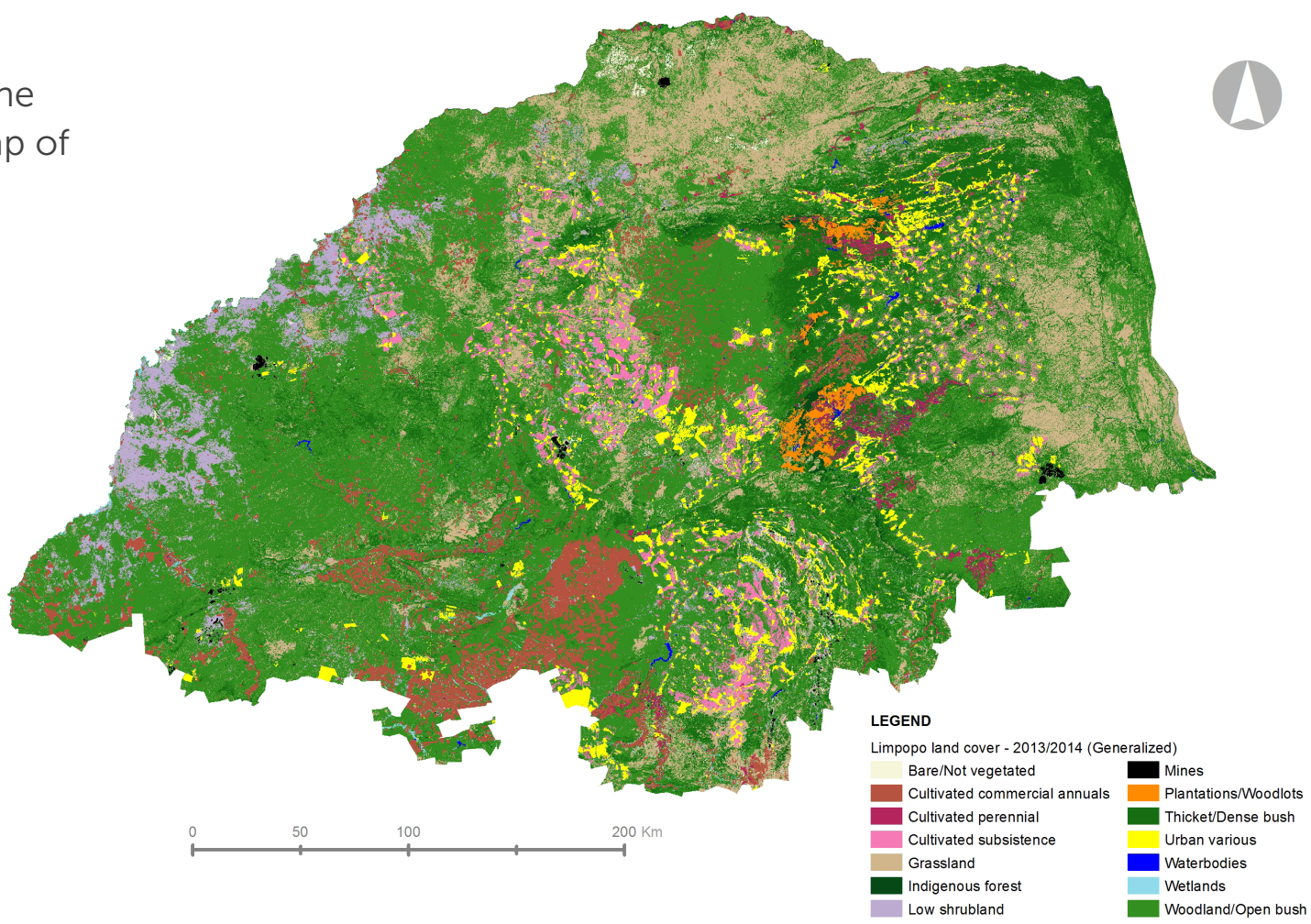


FIGURE 2

Annual ETLook evapotranspiration (ET) in 2014/15 for Limpopo.

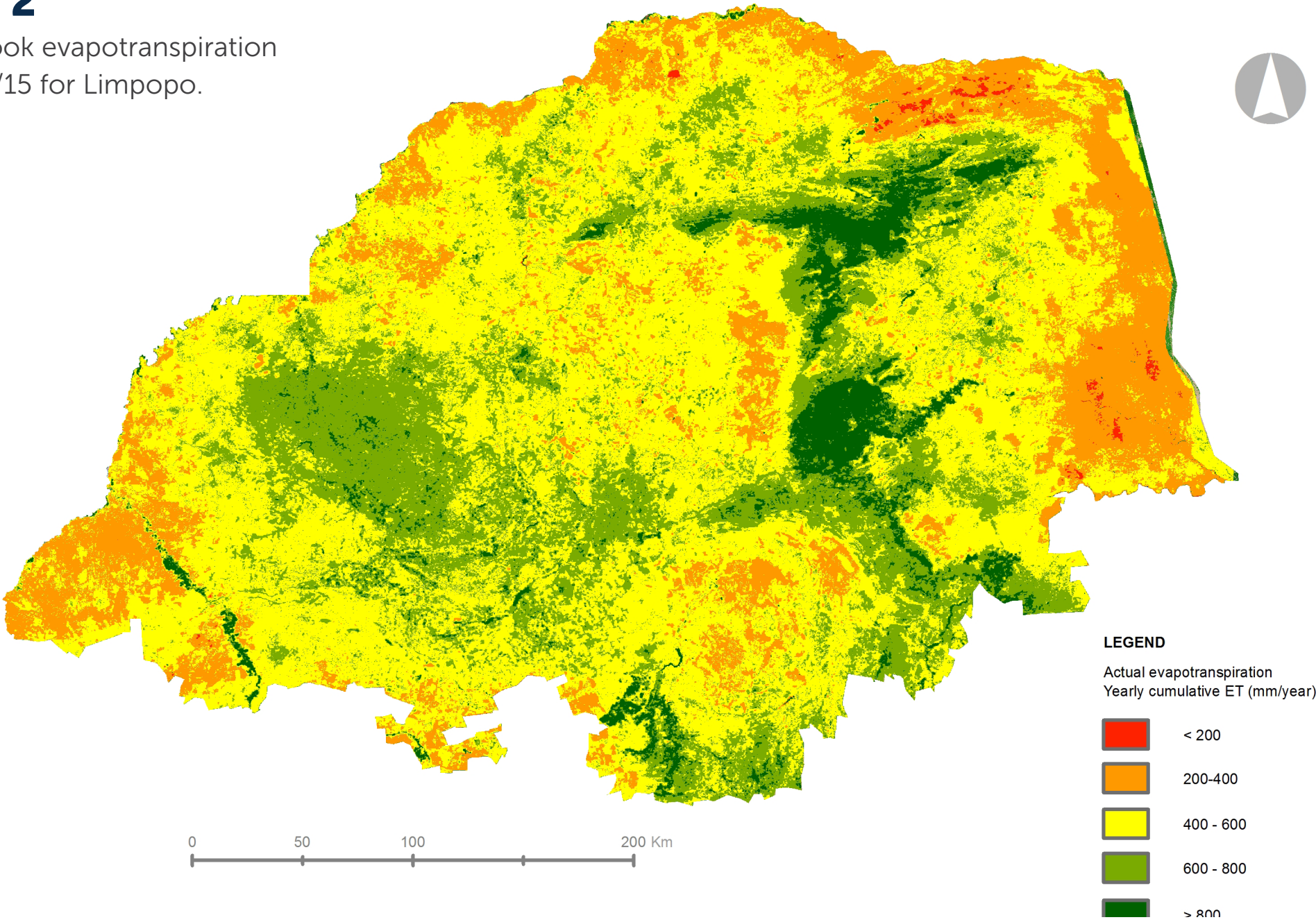


TABLE 2

Water use statistics for land cover groups based on annual ETLook data in 2014/15 for Limpopo:

Land use	Water use statistics						
	MEAN mm (a⁻¹)	MEDIAN (mm a⁻¹)	MIN (mm a⁻¹)	MAX (mm a⁻¹)	STD (mm a⁻¹)	AREA (km²)	CUM (Mm³ a⁻¹)
Waterbodies (WB)	1593	2185	69	3030	903	184	402
Wetlands (WTL)	719	659	76	2955	299	393	259
Indigenous Forest (INF)	1092	1117	240	2684	199	458	511
Thicket / Dense bush (TDB)	603	594	60	3031	196	17282	10265
Woodland / Open bush (WOB)	500	493	66	3031	126	61343	30228
Grassland (GRS)	502	499	69	3031	130	18891	9428
Shrubland fynbos (SHF)	-	-	-	-	-	-	-
Low shrubland (LSB)	500	494	68	3023	109	5812	2874
Cultivated commercial annuals (CCA)	604	589	97	3031	161	6752	3974
Cultivated perennial (CPE)	1025	998	222	2795	327	984	982
Cultivated subsistence (CSB)	537	535	126	2819	108	3993	2138
Cultivated cane (CC)	-	-	-	-	-	-	-
Plantations / Woodlots (PWD)	1126	1156	213	2721	189	815	941
Mines (MNS)	348	346	119	2590	145	245	85
Bare non-vegetated (BNV)	419	391	69	3023	218	655	256
Urban industrial (UIND)	427	429	156	2509	127	23	10
Urban commercial (UC)	431	427	165	2428	110	20	9
Urban residential (UR)	431	432	165	2551	97	134	58
Urban sport and recreation (ORS)	502	482	147	1232	120	95	46
Urban informal (UINF)	682	687	188	2715	205	54	37
Urban Others (UO)	448	430	110	3028	111	4319	1856

FIGURE 3

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

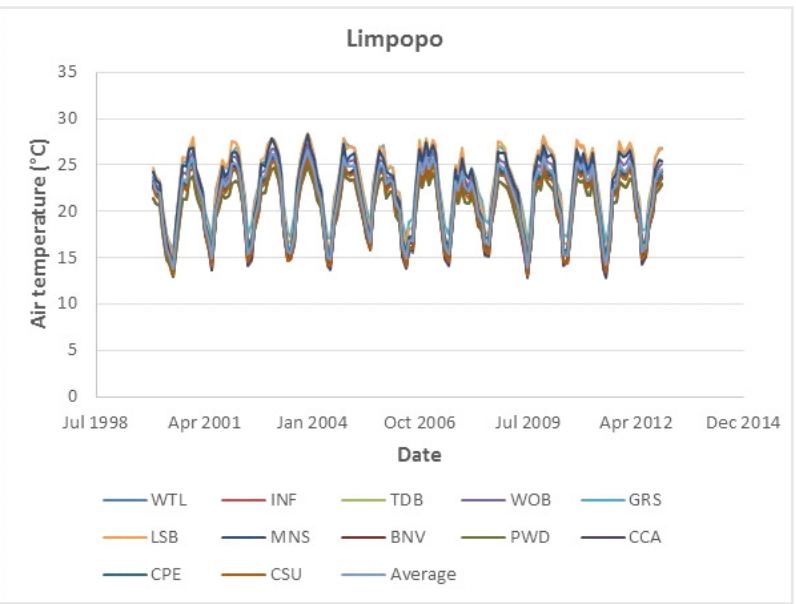


FIGURE 4

Monthly rainfall at representative stations in Limpopo (South African Weather Services) from 2000 to 2012.

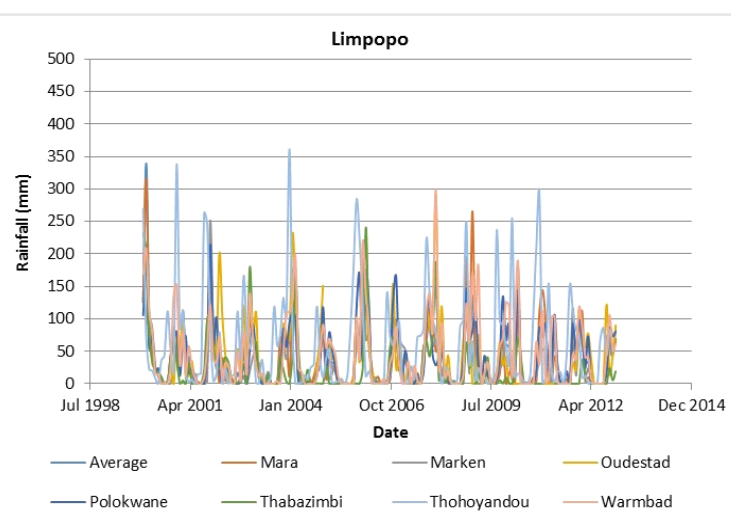
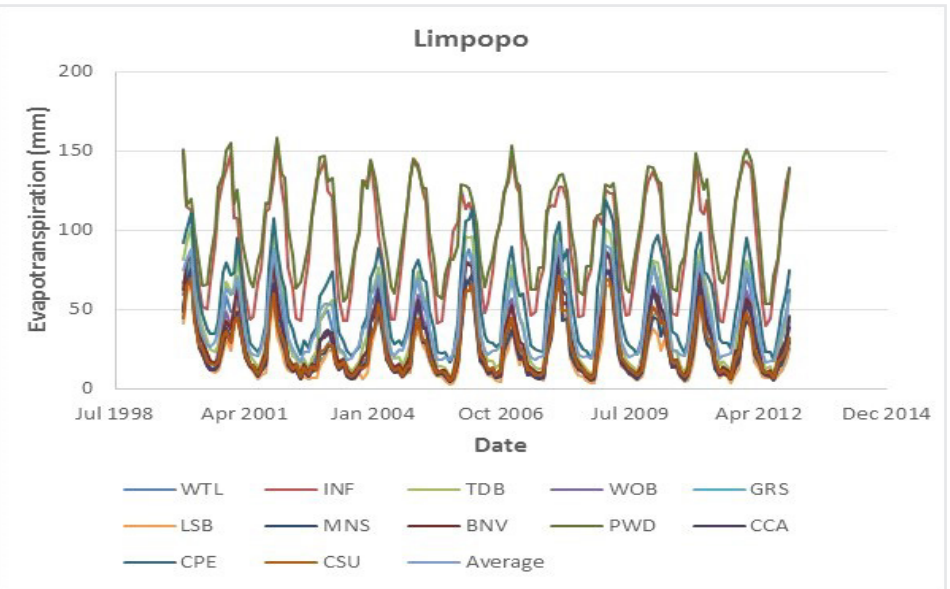


FIGURE 5

Monthly MOD16 evapotranspiration for different land cover groups in Limpopo from 2000 to 2012.



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

- Daily average air temperatures in Limpopo range from about 13°C to 27°C (Figure 3).
- Monthly rainfall shows large spatial variability with peaks up to 350 mm month⁻¹ occurring during summer months (Figure 4).
- MOD16 ET range from below 10 mm month⁻¹ in winter up to peaks of 150 mm month⁻¹ in summer (Figure 5), the latter especially in areas of plantations/woodlots, indigenous forests and cultivated perennial crops on the escarpment.

GUIDELINES AND RECOMMENDATIONS

- Irrigation is by far the major water user with a tendency to shift from annual to perennial crops. Incentivizing smart farming practices may reduce the volumes used in agriculture and hence reduce the burden on water resources. Smart water use measures need also to be implemented in forestry to limit streamflow reduction.
- Disposing waste is a substantial water use due to industrial and mining activities. 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 0.3% of water abstracted is re-used for wastewater irrigation).
- Increased industrial development will likely impact on industrial water use as well as water schemes and supply. Rural unregistered users may impact the results more than urban activities as these may have never been accounted for (land cover class Urban Others is unspecified and it covers a large area of 4319 km²).
- Although Limpopo is the province with the highest use of groundwater, there is potential for increasing conjunctive use of surface water and groundwater.
- Vast areas of woodland/open bush (water use 493 mm a⁻¹) and low shrubland (494 mm a⁻¹) encroaching grassland (499 mm a⁻¹) can be traded-off in support of development. Other vast areas, however, need strong conservation efforts such as wetlands.

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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)