environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

2019 National Terrestrial Carbon Sinks Assessment for South Africa

District Municipality Profile | Gert Sibande

Organic carbon pools

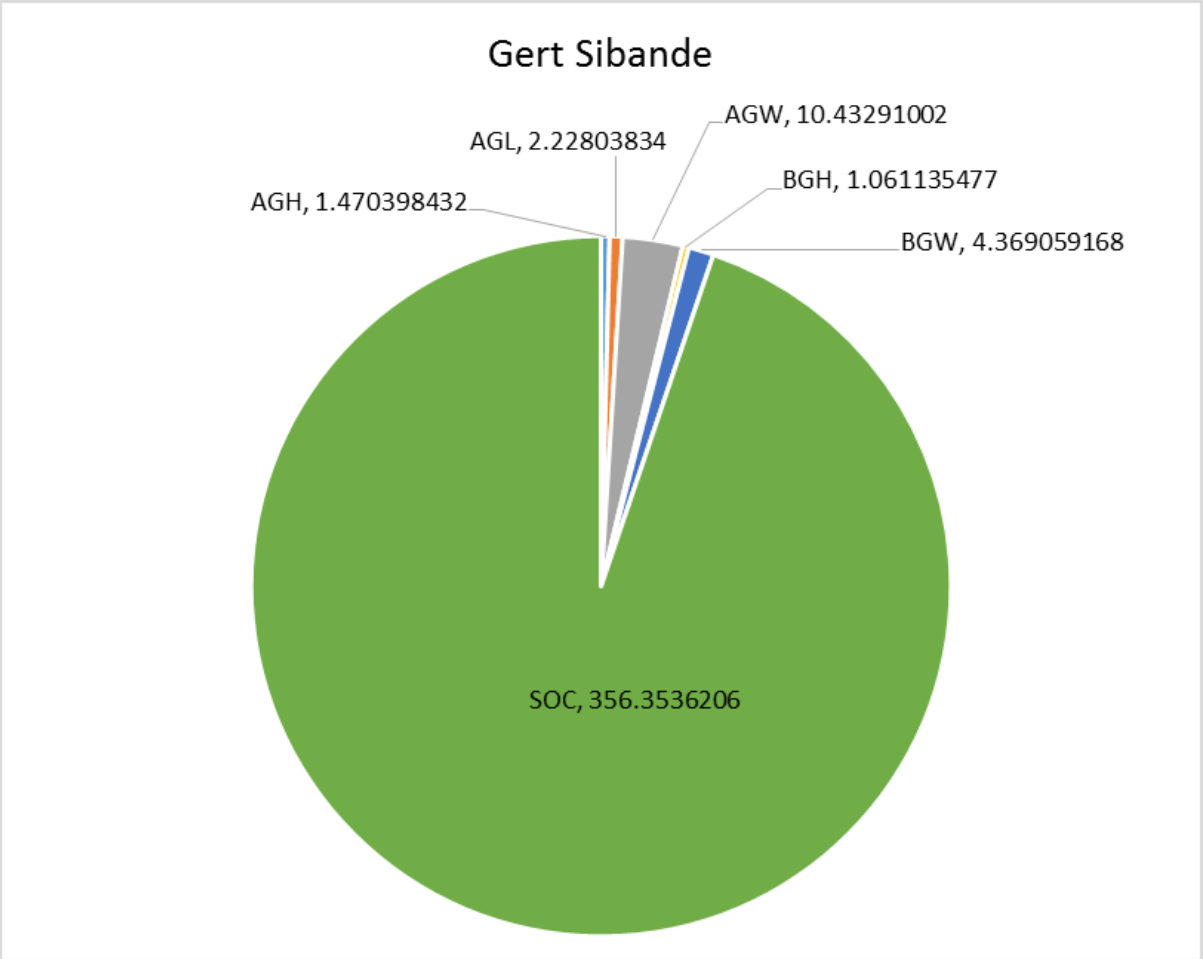

Figure 1. Split of organic carbon by carbon pool.

Organic carbon pools within the district of Gert Sibande are estimated to be 356 Tg and distributed per carbon pool as depicted in the Figure (1) above. Most carbon is to be found as soil organic carbon (SOC). The models that estimate the proposition of carbon as above ground woody carbon (AGW) are based on satellite imagery and do not differentiate between natural woody vegetation or planted trees. Below ground woody (BGW) carbon is based on AGW and varies across the country based on climate. Above ground herb (AGH) and below ground herb (BGH) is based on both natural vegetation and crop fields, on the proportional split per 1 km^2 land unit. Litter is based on biome level estimates.

SOURCE: CSIR our future through science

Land cover classes in 2018 (from national land cover map)

Land cover is used to determine changes in carbon stocks, and land cover change is seen as one of the key drivers for change in terrestrial carbon. Data from three national land cover products, NLC 1990, NLC 2014 and NLC 2018 are compared against 17 (or 18) land cover classes. Only the 2018 land cover includes fallow land, which was mapped as natural land or agricultural land in earlier land cover products. The bare ground land cover classes was found to show large changes in extent between land cover products, possibly as a consequence of that years rainfall. Figure 2 gives a summary of land cover classes as mapped in the 2018 NLC. Table 1 summarises important changes in land cover for the district.

Gert Sibande is the 10 highest rate of land lost to urbanisation between 1990 and 2018 out of the 52 South African districts, with 204 km^2 of natural or agricultural land converted to urban expansion.

Gert Sibande has the 3 highest rate of land lost to irrigation between 1990 and 2018 out of the 52 South African districts.

Gert Sibande lost 460 ha of dryland agricultural land between 1990 and 2018.

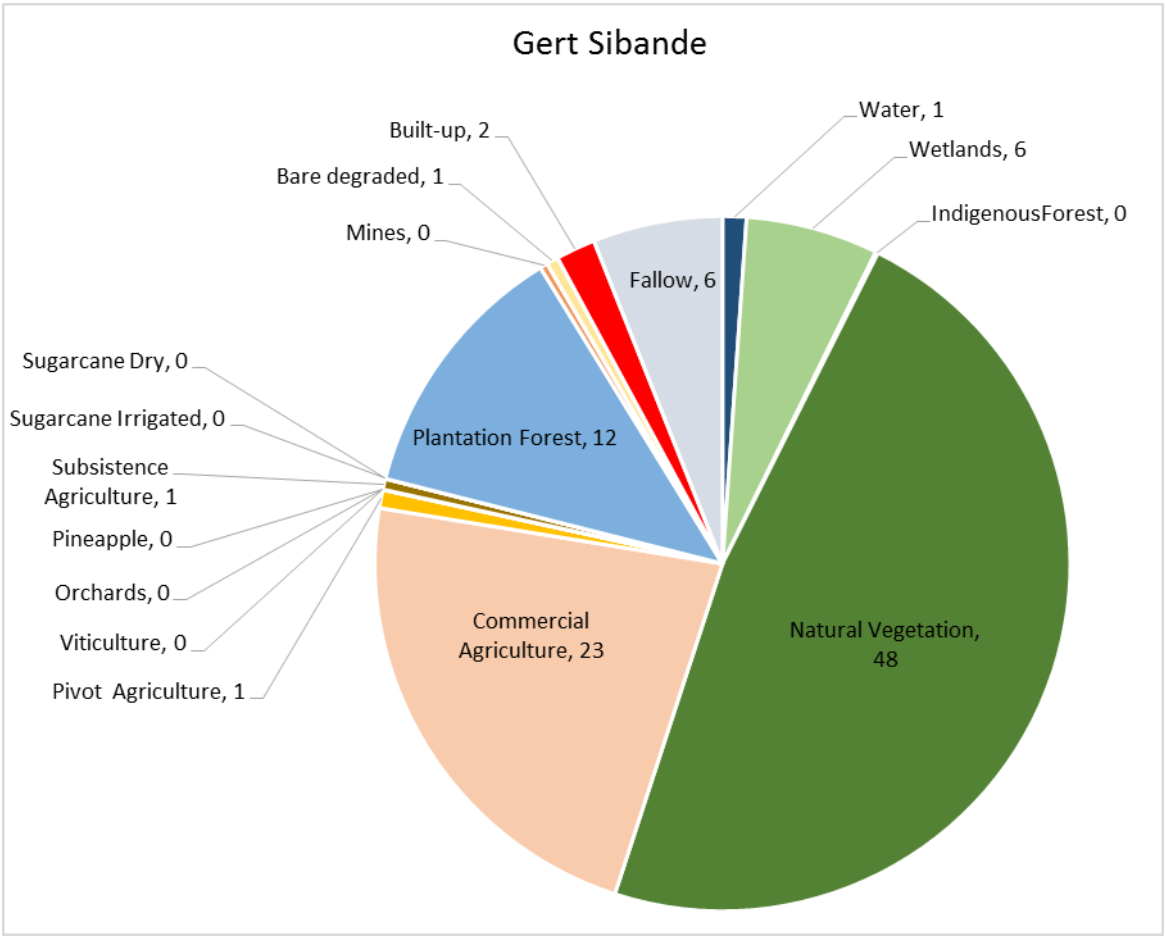

Figure 2. Estimates of the proportion of the district in each land cover class based on 2018 NLC data.

SOURCE: CSIR our future through science

Table 1. Drivers of change based on national land cover data from 1990, 2014 and 2018

	Area in km2			% of total land area			Area lost (-) or gained (+) 1990 to 2018	Area lost (-) or gained (+) 1990 to 2018
	1990	2014	2018	1990	2014	2018	Km2	% of total area
Water	275	263	352	1	1	1	77	0
Wetlands	1522	1297	1959	5	4	6	437	1
Indigenous Forest	11	26	33	0	0	0	22	0
Natural Vegetation	18189	18614	15139	57	58	48	-3050	-10
Commercial Agriculture	7729	6815	7167	24	21	23	-562	-2
Pivot Agriculture	68	228	269	0	1	1	201	1
Orchards	2	5	5	0	0	0	3	0
Viticulture	0	0	0	0	0	0	0	0
Pineapple	0	0	0	0	0	0	0	0
Subsistence Agriculture	225	235	161	1	1	1	-64	0
Sugarcane Irrigated	0	0	0	0	0	0	0	0
Sugarcane Dry	0	0	0	0	0	0	0	0
Plantation Forest	3253	3661	3906	10	12	12	653	2
Mines	108	125	113	0	0	0	5	0
Bare degraded	63	92	174	0	0	1	111	0
Built-up	379	463	584	1	1	2	204	1
Fallow	0	0	1917	0	0	6	1917	6

Loss in soil organic carbon (SOC) over time

Soil organic carbon loss is based on estimates of loss due to land cover change. Estimates of the total loss of SOC in the district based on both historic and recent land cover is given in table 2. In addition crude estimates are given on total carbon gains that might be possible from changed farming practices. Actual gains that can be realised will require local data based on local research, local crop choices, local farming practices and soil and climatic conditions.

Table 2. Estimated Soil Organic Carbon (SOC) loss due to agricultural activities and estimates of potential gains if all land cover was converted to conservation agriculture. Note: the extent to which conservation agriculture can restore SOC has not been established for the municipality, but will depend of crop choice, managements methods, soil type and climate.

SOURCE: CSIR our future through science

	Estimated loss (-) or gain (+) in soil organic carbon due to land use. Tg C			Estimated potential 20 year gains from conservation agriculture, assuming a 25%, 50% or 75% of lost SOC is regained Tg C		
	Loss before 1990	Total loss by 2014*	Total loss by 2018*	25%	50%	75%
Commercial Agriculture	1.469	1.285	1.356	0.339	0.678	1.017
Pivot Agriculture	0.008	0.027	0.031	0.008	0.016	0.024
Orchards	0.000	0.001	0.001	0.000	0.000	0.000
Viticulture	0.000	0.000	0.000	0.000	0.000	0.000
Pineapple	0.000	0.000	0.000	0.000	0.000	0.000
Subsistence Agriculture	0.052	0.054	0.039	0.010	0.019	0.029
Sugarcane Irrigated	0.000	0.000	0.000	0.000	0.000	0.000
Sugarcane Dry	0.000	0.000	0.000	0.000	0.000	0.000
Bare degraded	0.010	0.015	0.030	0.007	0.015	0.022
Fallow	Not estimated in 1990 or 2014		0.109	0.339	0.217	0.326
Built-up	Zero loss was assumed based on IPCC recommendations, but in reality this will depend on land use within the build-up area					
Total	1.539	1.381	1.891	0.473	0.945	1.418

- Note, total change might reduce within a class over time because land in that class reverts to a different land use class. Change between 2014 and 2018 is due to the inclusion of fallow land losses in the 2018 data, and should not be interpreted as a change between those two years. The 1990 to 2014 change data should be used to best understand long-term rates of loss, as the methodology for these two data sets was very similar.

SOURCE: CSIR our future through science