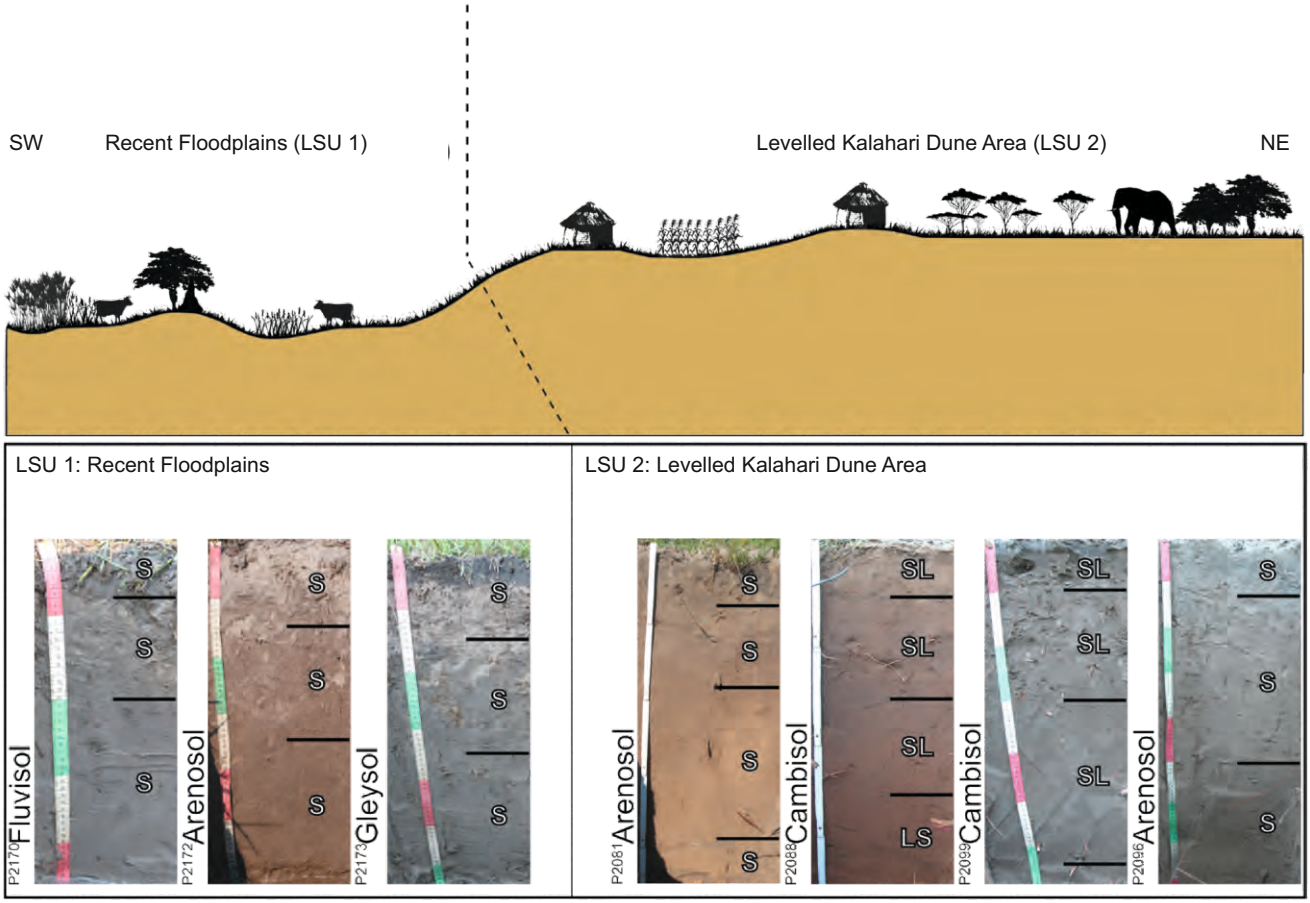

Fig. 1: Landscape transect of the Seronga core site with major landscape units (LSU), representative soil profiles with indication of texture classes for each horizon according to WRB (IUSS Working Group WRB 2006).

Recent Floodplains (LSU 1)

Recent Floodplains comprise a multitude of sites with different edaphic conditions. Only a few of these sites near the shoreline of the floodplains have been studied. Here, soils on the levees are Eutric Arenosols whereas in depressions Gleyic Fluvisols and Dystric Gleysols have been found.

Levelled Kalahari Dune Area (LSU 2)

The Kalahri Sandveld consists of two main units, the clayey sand of former floodplains (2.3) and the deep sand on degraded dunes (2.1). These units are connected by a third, very narrow transition zone (2.2). All three units have nearly identical topographic height but differ in soil types, soil colour and vegetation. The grey to dark gray soils of the former floodplains imply a soil community ranging from Eutric Arenosols to Haplic Cambisols. The reddish transition zone with Haplic Cambisols leads to the light brown to pale Dystric Arenosols of the former dunes dominated by *Terminalia sericea* woodland. As indicated by the texture triangle, the grain size composition of all soils is rather homogeneous and clay contents of more than 10% are an exception (Fig. 2).

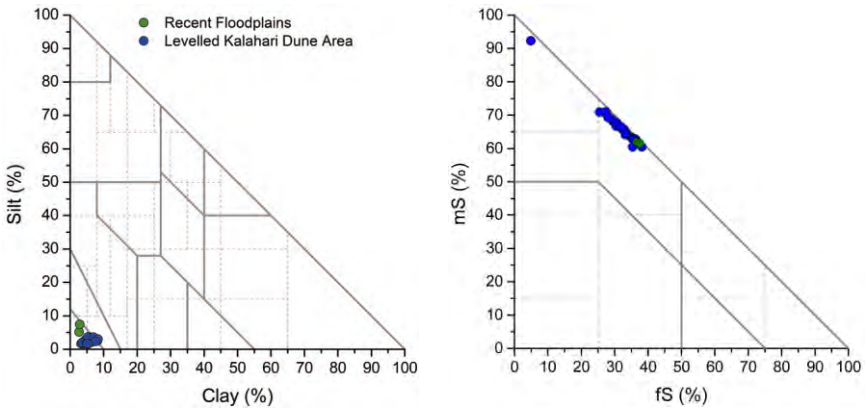

Fig. 2 a, b: Grain size distribution for all major landscapes in the Seronga core site. Figure 2 a shows the relation between clay, silt and loam. Figure 2 b shows the grain size distribution within the sand fraction.

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Table 1: Properties of selected reference soil profiles for Seronga.

No. LSU	**1**	**2**		
Name of LSU	**Recent Floodplains**	**Levelled Kalahari Dune Area**		
No. Sub-LSU	**1.1**	**2.1**	**2.1**	**2.2**
Name of Sub-LSU	Levee	Former Floodplains	Transition Zone	Former Dunes
No. reference profile	P 2170	P 2095	P 2088	P 2096
Soil type reference profile	Gleyic Fluvisol, eutric, greyic, arenic	Haplic Arenosol, eutric, greyic	Haplic Cambisol, eutric, greyic	Haplic Arenosol, dystric, hyperochric
Latitude [°]	-18.8279	-18.7777	-18.7687	-18.7632
Longitude [°]	22.4283	22.4057	22.4371	22.4229
Topographic height [m a.s.l.] *	980	978	988	988
Topsoil properties				
Soil colour (wet)	10YR 3/1	10YR 3/1	7,5YR 3/2	10YR 4/1
pH (in $CaCl_2$)	4.6	5.3	5.1	3.8
EC [µS cm^{-1}]	114	29	20	12
Total organic carbon [% DW]	4.58	0.63	0.33	0.39
Total inorganic carbon [% DW]	0	0	0	0
Total nitrogen [% DW]	0.421	0.064	0.031	0.033
C/N ratio	10.9	10.0	10.7	11.7
Nitrate in water extract [mg kg^{-1}]	1.3	10.0	7.2	4.9
Plant available phosphorous [mg kg^{-1}]	38.38	25.43	10.03	14.65
Exchangeable potassium [mg kg^{-1}]	0.00	103.67	53.32	16.08
Plant available potassium [g kg^{-1}]	0.162	0.089	0.052	0.005
Exchangeable magnesium [mg kg^{-1}]	0.00	88.42	64.81	10.49
Magnesium water extract [mg kg^{-1}]	4.7	19.5	11.4	1.5
Exchangeable calcium [mg kg^{-1}]	0.00	621.03	284.45	55.00
Calcium water extract [mg kg^{-1}]	24.7	19.5	9.8	2.8
Subsoil properties (1 m)				
Soil colour (wet)	10YR 5/1	10YR 3/2	7.5YR 3/4	10YR 4/2
pH (in $CaCl_2$)	4.5	5.4	3.6	3.8
EC [µS cm^{-1}]	15	20	10	7
Total organic carbon [% DW]	0.12	0.23	0.16	0.12
Total inorganic carbon [% DW]	0	0	0	0
Total nitrogen [% DW]	0.013	0.025	0.016	0.014
C/N ratio	9.5	9.4	10.1	8.3
Nitrate in water extract [mg kg^{-1}]	0.4	4.8	1.4	n.a.
Plant available phosphorous [mg kg^{-1}]	12.51	n.a.	6.52	n.a.
Exchangeable potassium [mg kg^{-1}]	0.00	82.12	127.19	7.82
Plant available potassium [g kg^{-1}]	2.4	16.6	21.8	n.a.
Exchangeable magnesium [mg kg^{-1}]	0.00	133.79	56.71	2.78
Magnesium water extract [mg kg^{-1}]	1.1	14.2	11.7	n.a.
Exchangeable calcium [mg kg^{-1}]	0.00	541.54	35.72	6.09
Calcium water extract [mg kg^{-1}]	3.7	12.0	1.7	n.a.

n.a.: not analysed; * measured by GPS

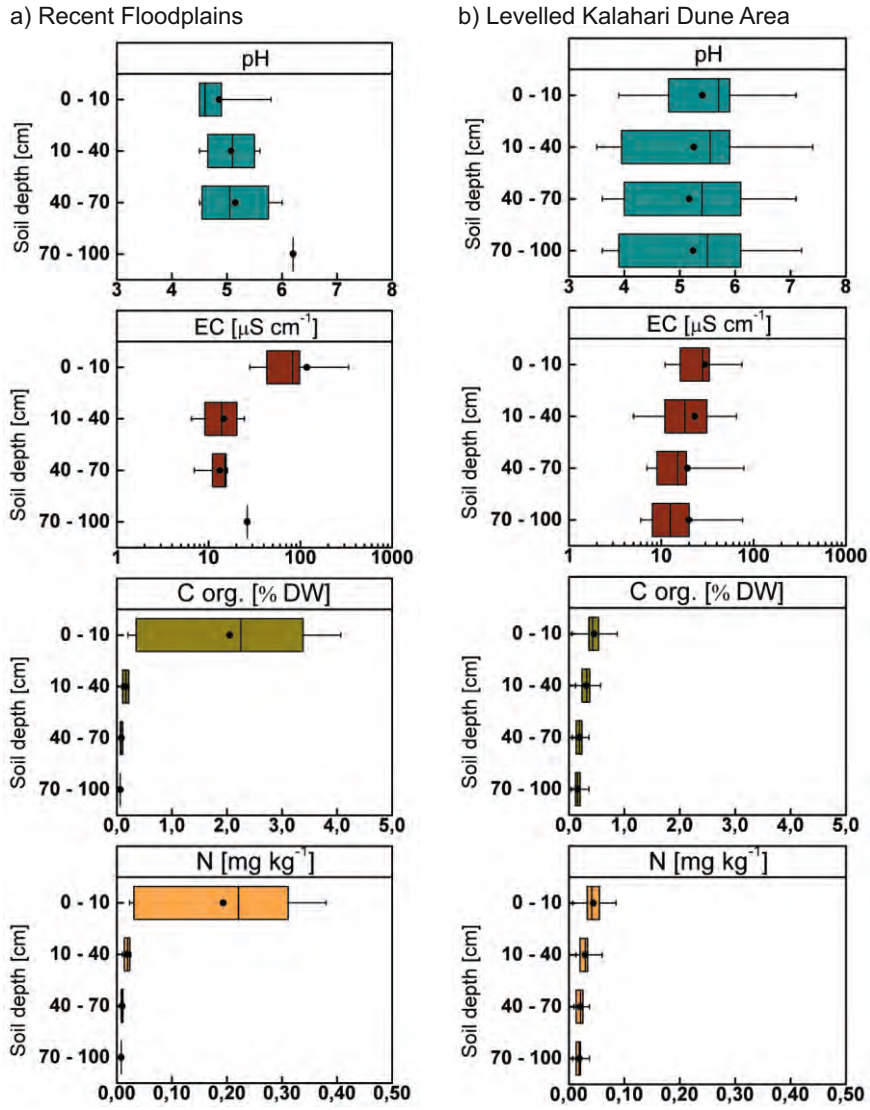

Fig. 3 a, b: Boxplots (Box: 25%, 75% percentile, mean and median; Whisker: min./max.) showing pH, electrical conductivity, organic carbon content and total nitrogen content for four depth intervals comparing LSU 1 (a) with LSU 2 (b).

The structural division of the landscape into two main landscape units, consisting of the Panhandle's Recent Floodplains (LSU 1) and the adjacent levelled Kalahari Dune Area (LSU 2), is also reflected by the differences in the soil chemical properties (Fig. 3). Within the Recent Floodplains a variety of soils such as Histosols, Fluvisols, sandy Gleysols and Endogleyic Arenosols are characteristic but have only been partly analysed. Here, low to medium pH values and high topsoil carbon (4.1%) and nitrogen (0.38%) content are found, similar to those determined for the same unit at Mashare. However, subsoil nutrient contents are considerably lower in the Seronga floodplains due to nutrient leaching as a consequence of higher groundwater table throughout the year.

The absence of topographic features, like dry riverbeds in Seronga's levelled Kalahari Dune Area (LSU 2) leads to lower maximum values of the chemical parameters in comparison to LSU 3 at the Mashare core site. Nevertheless, mean values show a good comparability between these two core sites with slightly to strongly acidic pH values and very low organic carbon and nitrogen contents. The catena of dark coloured Cambisols to reddish to pale Arenosols, which is reflected by a typical gradient in vegetation, is characterized by a clear decline in potassium, magnesium and calcium and an increase in available zinc content.

Fig. 4: Installation of a soil water monitoring station on a dryland agriculture field in Seronga (photo: A. Groengroeft).

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