Supplementary Information to Vegetation trends, drought severity and land use-cover change over the growing season in semi-arid contexts

Table S1: Characteristics of the constituencies in the Central District

Administrative code of the constituency	Name of constituency	Area (km^2)	Human population (as of 2011 census)
19	Lerala-Maunatlala	3228	33743
25	Serowe north	4608	33404
23	Mahalapye west	488	32896
26	Serowe west	15605	25572
28	Boteti east	16538	37534
16	Mmadinare	9374	38436
21	Sefhare-Ramokgonami	4361	31517
27	Serowe south	3146	35400
12	Nkange	4129	42402
14	Tonota	5389	39189
13	Shashe west	3815	37032
15	Bobonong	8811	42472
29	Boteti west	19290	32390
22	Mahalapye east	5031	25835
24	Shoshong	10580	29147
11	Nata Gweta	31162	31533
20	Palapye	978	40691

Compiled from Parliament.gov.bw

Land cover datasets produced by the European Space Agency (ESA-LC) Climate Change Initiative land cover (CCI-LC) v2.0.7 (Santoro et al., 2017) and Copernicus Climate Change Service (C3S-LC) Mv52 were used for the analysis of vegetation change and drought severity. The land categories were aggregated to match those utilized by the Intergovernmental Panel on Climate Change and the United Nations Convention to Combat Desertification (Table S2).

Table S2: Land cover classification scheme

Code	Original land categories	Codes for aggregated class	Name
50	Tree cover, broadleaved, evergreen, closed to open (>15%)	1	Tree-covered area
60	Tree cover, broadleaved, deciduous, closed to open (>15%)		
61	Tree cover, broadleaved, deciduous, closed (>40%)		
62	Tree cover, broadleaved, deciduous, open (15-40%)		
70	Tree cover, needleleaved, evergreen, closed to open (>15%)		
71	Tree cover, needleleaved, evergreen, closed (>40%)		
72	Tree cover, needleleaved, evergreen, open (15-40%)		
80	Tree cover, needleleaved, deciduous, closed to open (>15%)		
81	Tree cover, needleleaved, deciduous, closed (>40%)		
82	Tree cover, needleleaved, deciduous, open (15-40%)		
90	Tree cover, mixed leaf type (broadleaved and needleleaved)		
100	Mosaic tree and shrub (>50%) / herbaceous cover (<50%)		
160	Tree cover, flooded, fresh or brakish water		
170	Tree cover, flooded, saline water		
110	Mosaic herbaceous cover (>50%) / tree and shrub (<50%)	2	Grassland
130	Grassland		
120	Shrubland		
121	Shrubland evergreen		
122	Shrubland deciduous		
150	Sparse vegetation (tree, shrub, herbaceous cover) (<15%)		
151	Sparse tree (<15%)		
152	Sparse shrub (<15%)		
153	Sparse herbaceous cover (<15%)		
10	Cropland, rainfed	3	Cropland
11	Herbaceous cover		
12	Tree or shrub cover		
20	Cropland, irrigated or post-flooding		
30	Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous cover) (<50%)		
40	Mosaic natural vegetation (tree, shrub, herbaceous cover) (>50%) / cropland (<50%)		
180	Shrub or herbaceous cover, flooded, fresh/saline/brackish water	4	Waterbodies, incl. wetland
210	Water bodies		
190	Urban areas	5	Artificial surface
200	Bare areas		
201	Consolidated bare areas	6	Otherland
202	Unconsolidated bare areas		

Table S3: Land cover transition matrix in km^2 (2000 - 2018)

		Target year (2018) land classes (area of change from initial to target time in km^2)						**2000 Total**
Initial year (2000) land classes		Tree-covered area	Grassland	Cropland	Wetland	Artificial surface	Otherland	
	Tree-covered area	**11486.43**	28.89	1424.07	3.33	3.69	4073.49	17088.52
	Grassland	9215.28	**8205.03**	4485.42	43.02	123.39	90526.23	112850.31
	Cropland	949.68	39.42	**6036.57**	0.18	2.43	2200.14	9285.03
	Wetland	2.25	12.42	1.98	**138.96**	0.36	45.63	264.89
	Artificial surface	2.70	1.89	0.81	0.18	**66.33**	5.13	110.40
	Otherland	3.60	773.28	7.83	35.10	3.33	**7727.76**	8577.08
	2018 total	21659.94	9060.93	11956.68	220.77	199.53	104578.38	148176.23

Note: Persistence is shown in bold.

To map drought severity in each constituency over the entire time-series, there was the need to decide on the best option for visualization and analyzing drought frequency. Three VCI values were used for analysis. These are the VCI modal values (majority) representing the most occurring VCI values recorded in a constituency during a certain growing season (refer to the paper Fig. 8), VCI minimum values representing the lowest VCIs recorded in a constituency for a certain growing season (Fig. S1), and the mean values representing the average VCIs recorded in a constituency for a certain growing season (Fig. S2).

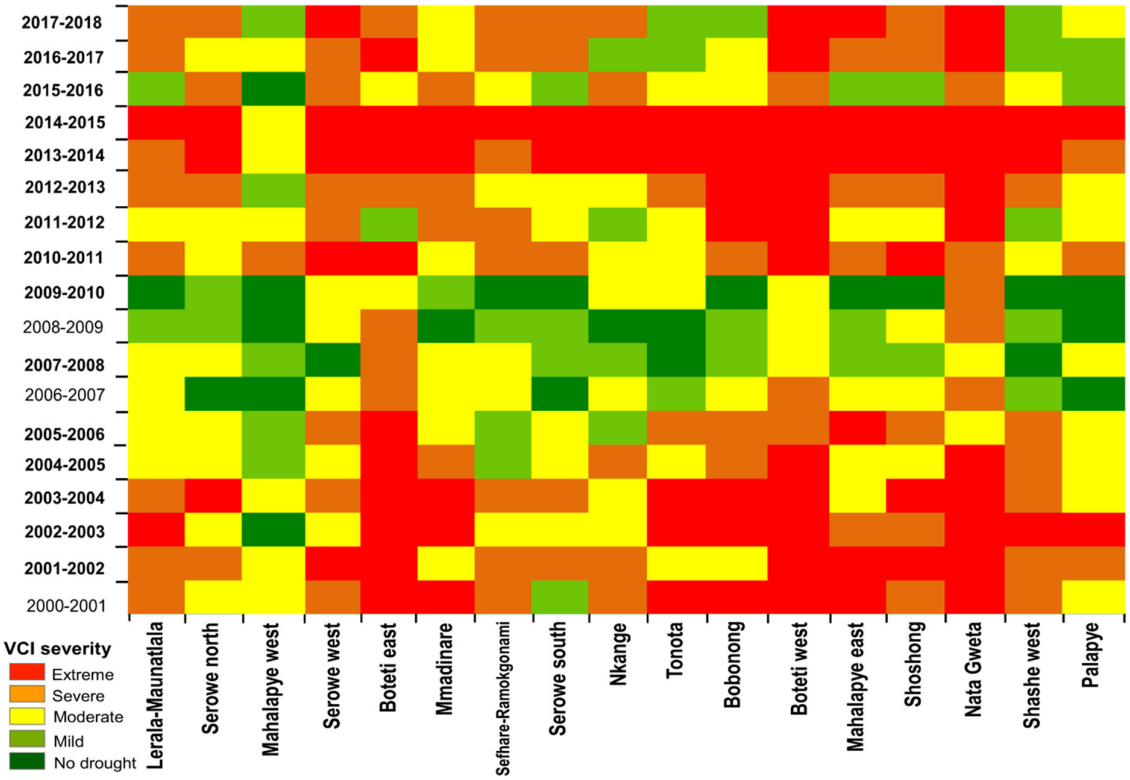

Figure S1: VCI minimum value heatmap of drought severity at constituency level during the growing seasons of 2000-2001 to 2017-2018.

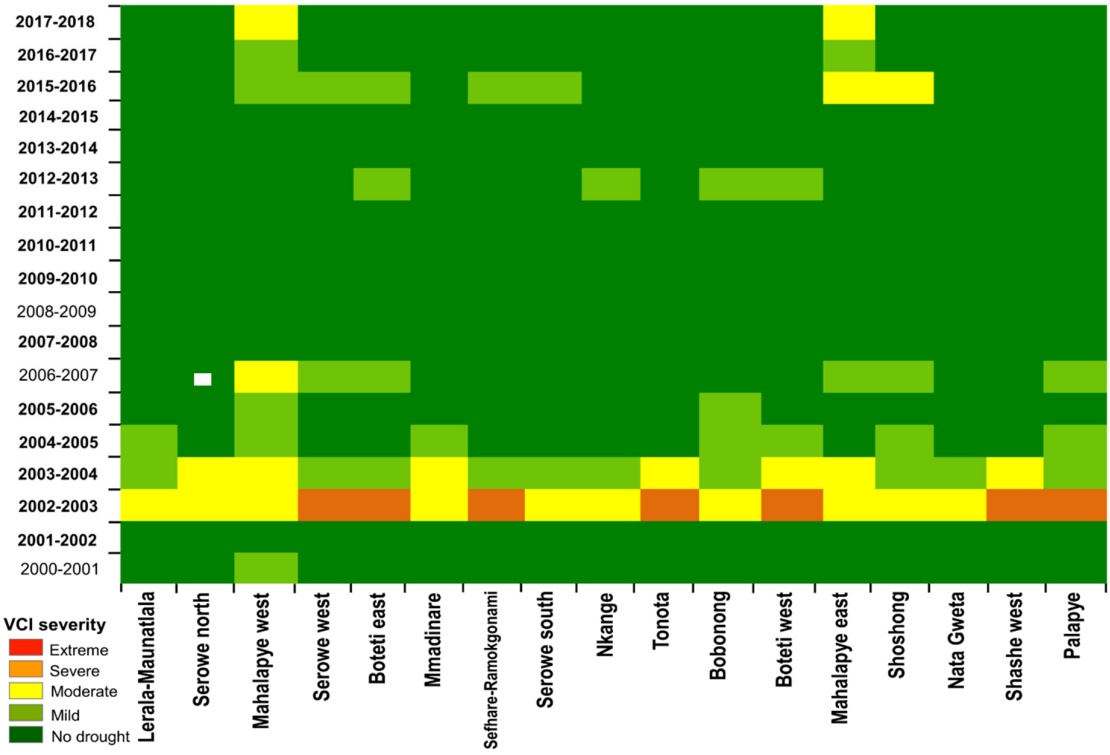

Figure S2: VCI mean value heatmap of drought severity at constituency level during the growing seasons of 2000-2001 to 2017-2018.