Brief Communication

Long-term vegetation dynamics in the semi-arid Kalahari

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Seasonal and medium-term vegetation dynamics have been monitored in the semi-arid Kalahari (Fourie, De Wet & Page 1987, *Journal of the Grassland Society of Southern Africa* 4: 48-54; Van Rooyen, Bezuidenhout, Theron & Bothma 1990, *Koedoe* 33: 63-88) but little information is available on longer-term trends. For conservation areas such as the Kalahari Gemsbok National Park (KGNP), which is largely protected from the over-utilisation commonly observed in adjacent livestock farming systems, it is of particular importance to have data of such nature. An opportunity to gather information on longer-term vegetation dynamics in the KGNP occurred when vegetation surveys done by Brynard (1958)(*Koedoe* 1: 162-183) in the Park were repeated after 33 years in 1990. Brynard (1958)(*Koedoe* 1: 162-183) used the wheel-point method (2 000 points) to determine the percentage basal cover and species composition of the vegetation at five different localities along the Nossob River. Three of the surveys were done in the dune veld near Grootkolk, Rooikop and Kij-Kij, five kilometers perpendicular to the road at the watering points. One survey was done in the immediate vicinity of the watering point at Kaspersdraai in the dry Nossob River, and the other about 1,5 km from the watering point, on the river terrace. During 1990 these surveys were repeated during May at approximately the same localities. The significance of differences ($P = 0,05$) was obtained from graphs supplied by Tidmarsh & Havenga (1955)(*Memoirs of the Botanical Survey of South Africa* 29: 1-49).

The results are presented in Tables 1 - 5. Comparison of results from the three dune veld habitats indicate that the species composition and also the species dominance, as indicated by basal cover, had not changed significantly over the 33 years period (Tables 1,2 & 3). In the under utilised dune

Table 1
Floristic coomposition and basal cover of the dune-veld near Grootkolk during the 1958 and 1990 surveys

Species	% Basal cover	
	1958	1990
Eragrostis lehmanniana	2,05	2,25
Centropodia glauca	1,15	0,06
Stipagrostis uniplumis	0,04	0,15
Fimbristylis hispidula	0,25	0,00
Acacia mellifera	0,15	0,00
Schmidtia kalihariensis	0,10	0,20
Grewia flava	0,10	0,00
Aristida meridionalis	0,05	0,05
Acacia erioloba	0,05	0.00
Oxygonum dregeanum	0,05	0.00
Aptosimum depressum	0,05	0.00
Plinthus sericeus	0,05	0.00
Chamaesyce inaequilatera	0,00	0.05
Total	4,50	3,30

Table 2
Floristic composition and basal cover of the dune-veld near Rooikop during the 1958 and 1990 surveys

Species	% Basal cover	
	1958	1990
Eragrostis lehmanniana	1,50	1,67
Aristida meridionalis	1,35	0,00
Fimbristylis hispidula	0,60	0,00
Centropodia glauca	0,40	1,40
Stipagrostis amabilis	0,40	0,47
Stipagrostis ciliata	0,20	0,10
Stipagrostis uniplumis	0,15	0,40
Schmidtia kalihariensis	0,10	0,17
Acacia hebeclada	0,05	0,00
Hermannia tomentosa	0,05	0,00
Dicoma capensis	0,05	0,00
Indigofera sp.	0,05	0,00
Plinthus sericeus	0,05	0,00
Brachiaria glomerata	0,00	0,07
Total	4,95	4,28

Table 3
Floristic composition and basal cover of the dune-veld near KijKij during the 1958 and 1990 surveys

Species	% Basal cover	
	1958	1990
Eragrostis lehmanniana	1,35	1,70
Centropodia glauca	0,40	0,45
Stipagrostis uniplumis	0,20	0,10
Fimbristylis hispidula	0,20	0,00
Hermannia tomentosa	0,15	0,00
Plinthus sericeus	0,05	0,10
Stipagrostis amabilis	0,05	0,10
Acacia haematoxylon	0,05	0,00
Oxygonum dregeanum	0,05	0,00
Limeum viscosum	0,00	0,10
Schmidtia kalihariensis	0,00	0,05
Other species	0,10	0,05
Total	2,60	2,65

Table 4
Floristic composition and basal cover of a Stipagrostis obtusa *stand near Kaspersdraai during the 1958 and 1990 surveys. * = significantly different from value of first survey (P = 0,05)*

Species	% Basal cover	
	1958	1990
Stipagrostis obtusa	3,65	7.10*
Helichrysum sp.	0,10	0,00
Rhigozum trichotomum	0,05	0,00
Acacia hebeclada	0,05	0,00
Indigofera alternans	0,00	0,15
Schmidtia kalihariensis	0,00	0,10
Lotononis platycarpa	0,00	0,05
Other species	0,05	0,00
Total	3,90	7,40*

veld *Eragrostis lehmanniana* was most constantly present and is known to react favourably to the first rains after dry periods (Fourie *et al.* 1987, *Journal of the Grassland Society of Southern Africa* 4: 48-54).

In the *Stipagrostis obtusa* stand near Kaspersdraai a significant increase in total basal cover was detected and appears attributable to *Stipagrostis obtusa* (Table 4). This is probably the result of low grazing pressure during the prolonged drought of the eighties and high rainfall in the 1988/1989 season. Similar results were found by Van Rooyen *et al.* (1990)(*Koedoe* 33: 63-88) near Kousaunt in the KGNP.

Table 5
Floristic composition and basal cover in the riverbed at Kaspersdraai during the 1958 and 1990 surveys

Species	% Basal cover	
	1958	1990
Schmidtia kalihariensis	1.75	2,40
Acacia erioloba	0,10	0,00
Rhigozum trichotomum	0,05	0,20
Fimbristylis hispidula	0,05	0,10
Plinthus sericeus	0,05	0,00
cf. *Chamaesyce inaequilatera*	0,05	0,00
Stipagrostis obtusa	0,00	0,30
Indigofera alternans	0,00	0,30
Dicoma capensis	0,00	0,10
Eragrostis lehmanniana	0,00	0,10
Monechma incanum	0,00	0,10
Other species	0,05	0,00
Total	2,10	3,60

Schmidtia kalihariensis, an ephemeral grass species, was abundant in the immediate vicinity of the watering point at Kaspersdraai in both surveys (Table 5). This species is known to be an indicator of disturbance (trampling or exposed areas due to drought), and is usually abundant in disturbed localities after rain, especially when good rains follow a long period of drought. It generally occurs in pure stands and is believed to have allelopathic properties.

Although the vegetation of a large conservation area within the Kalahari shows definite changes in the short to medium term, mainly in reaction to rainfall (Van Rooyen *et al.* (1990)(*Koedoe* 33: 63-88), the above findings indicate that in the long term the vegetation is in balance with the environment. The only deviation from this cyclic pattern will be in the event of climatic change or the overutilisation of vegetation around man-made watering points. This conclusion supports the findings of Van der Walt, Retief, Le Riche, Mills & De Graaff(1984)(*Koedoe* Suppl. 27: 119-128) that an ecological balance prevails at present in the KGNP but which will continue only if the present size of this conservation area is maintained. This sensitive equilibrium can, however, easily be disturbed or even destroyed by mismanagement.