ABSTRACTS: THURSDAY 22 JULY 2010

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Monitoring in Protected Areas

SESSION CHAIR: RINA (C) C GRANT

Thursday, 22 July 2010, 08:30-10:30

Platform & Poster Presentations

PLATFORM PRESENTATION: COMPARATIVE ANALYSIS OF VEGETATION COMPOSITION AND DIVERSITY AROUND FUNCTIONAL AND CLOSED WATER POINTS IN ETOSHA NATIONAL PARK, NAMIBIA: PRELIMINARY FINDINGS

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To alleviate the challenge of water scarcity in semi-arid and arid areas, ranch and park managers resort to provision of year-round water to animals by constructing artificial water points. This has led to prolonged local occupancy and high densities of animals around water points resulting in vegetation and soil degradation. Despite the abundance of literature on the issue, the phenomenon has not been investigated in the Etosha National Park, where animal numbers have been steadily increasing over the years. This research was designed to investigate how herbivores have impacted on vegetation around water points by comparing functional (wet) and closed (dry) water points.

Four water points were selected for the study, two functional and two that have been closed for over 20 years. Vegetation was inventoried in 84 plots demarcated at 50m, 100m, 200m, 400m, 800m, and 1600m along transects radiating from each water point in four compass directions. Species richness and diversity did not differ significantly among distances and between types of water points, largely due to invasion of weedy, herbaceous plants in the more disturbed sites (e.g. *Tribulus terrestris, Datura innoxia*) which tended to compensate for species lost due to herbivore impacts. This was more pronounced at functional water points. However, species composition varied significantly between closed and functional water points and along the distance gradient ($F = 1.44$, $P<0.05$) where plots at distances of 800m-1600m at functional water points were clearly separated from the rest. However, some plots at distances >800m at functional water points were clustered with plots from closed water points, indicating gradual disappearance of the piosphere and a recovery trend for vegetation around dry water points, where *Eragrostis nindensis*, a sub-climax grass, was dominant. Closed water points temporarily collect water during the wet season; hence herbivore pressure is only limited to short periods of occupancy. Plots from functional water points show a wider scatter and are largely grouped according to the water point they came from but such a pattern is not evident for closed water points.

Thus, differences in vegetation are not only due to impacts of herbivores but soil type, topography and other factors are also important. It appears that 800m from a water point is a distance that corresponds to a significant decay in herbivore impact, but is dependent upon local physical and other conditions. A system of 'spreading out' of herbivore pressure by systematically closing and opening water points in given seasons in specific areas should be considered. Results also show that the size of the piosphere varies among water points, an observation that must be used to improve sampling design - from systematic prescribed distance sampling along transects to a design informed by the relative piosphere sizes.

NOTES:

PLATFORM PRESENTATION: THE USE OF LAND TYPE MAPPING UNITS FOR SAMPLE SITE PLACEMENT IN ORDER TO CALCULATE THE CARRYING CAPACITY OF A LARGE SAVANNA AREA

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Recognition and delimitation of relatively homogenous units prior to sampling vegetation is commonly referred to as the stratification process. Use was made of the Land Type mapping units to stratify the Heritage Park prior to sampling the various abiotic and biotic components in the study area. One of the research objectives was to determine the carrying capacity of the Park and accordingly herbaceous layer and woody vegetation sampling sites were placed within the Land Type mapping units assuming that these units reflected a floristic homogeneity. The Heritage Park forms a corridor between the Pilanesberg National Park and Madikwe Game Reserve in the North West Province and is 90 333 ha in extent. The area is represented by eight different Land Types (Ae57, Ae61, Ae237, Ae251, Ea70, Ea155, Fa293 and Fb147) at a scale of 1:75 000 and 109 sampling sites were placed within these mapping units. The surveys were carried out during the growing season of 2008 and 2009. At each site the species composition and frequency data were recorded for the herbaceous layer using a 200 point Nearest Plant Method and woody data were collected as prescribed for the BECVOL method.

The species composition values calculated for each Land Type showed a 42% range of percentage similarity. Similarly grass and woody species composition did not reflect distinct floristic differences between Land Types. However, when floristic data were placed, by Detrended Correspondence Analysis, in terrain units at different altitudes distinct groupings occurred with a reduced range of percentage similarity at 29%.

The detailed combination of terrain types, pedosystems and climate zones constituting Land Type units were less suitable for the stratification of vegetation units. Use should be made either of the broader Land Type soil description units: red-yellow apedal soils and high clay soils or topographic and altitudinal factors when stratifying large savanna areas.

NOTES:

PLATFORM PRESENTATION: MONITORING MEDIUM TERM WOODY VEGETATION TRENDS IN PROTECTED AREAS OF THE LOWVELD

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A comparison of aerial photographs of the Lowveld exhibits a pattern of increasing woody plant density over extensive areas. Tourism-based operations are adversely affected because the dense woody layer reduces game visibility. Historically, open woodlands were invaded by woody plants through management practices such as poorly positioned roads which led to dessication of the low lying areas and a thickening up of woody plants. The process is hastened by heavy grazing, trampling and reduced fire frequency. To counter such densification, large tracts of the Lowveld have been cleared/thinned over the past 30 years. In some instances we have therefore moved from what was perceived to be a 'bush encroached' situation, to a much more open situation.

With the removal of the fence between the Kruger National Park and the protected areas to the west in 1993 there was a dramatic increase in the number of elephant in the area. This range expansion by elephant has raised a concern that there is overutilisation of tall trees in these areas.

Results indicate a reduction in the number of trees in the taller (>5m) height class (Figure 1). In structural terms therefore, it appears that we are moving from a heterogenous savanna towards homogenous open grassland in some areas (those heavily thinned/cleared) to low closed woodland in other areas. In both the latter instances the taller height classes being reduced by increased elephant numbers. The result of such altered structure has potentially far reaching yet different outcomes; a) in the 'open' grassland situation a reduction in the amount of accessible browse thus impacting negatively on the browser population and in extreme cases a reduction in shade loving palatable grasses due to reduction in sub-canopy habitat which negatively impacts on grazers; b) a reduction in the grass layer in the low closed woodland due to competition with the woody layer which has a positive spin-off for browsers but is deleterious for grazers.

It is clear therefore that while some habitat manipulation may in fact be necessary, the effects, alone or in combination with megaherbivores may result in altered numbers and ratios of herbivore species due to changes in vegetation species composition and habitat structure.

NOTES:

PLATFORM PRESENTATION: MONITORING OF VEGETATION IN THE NGOMA FOREST OF KAFUE NATIONAL PARK, ZAMBIA

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The Ngoma forest is a critical habitat inside the Kafue National Park of Zambia. In the core of this forest is the Baikiaea forest. The Ngoma forest has been prone to disturbances by elephants and fire, though the Baikiaea forest, which is situated inside the BaikiaeaNgoma forest, has been left unhindered by fires due to the low availability of fuel. No continuous monitoring of the vegetation has been undertaken despite these disturbances. Extensive vegetation studies were, however, conducted during the General Management Planning Project in the late nineties. In 2004 the Support to Economic Expansion and Diversification (SEED) project commenced in the Kafue National Park with funding from the Royal Government of Norway and World Bank through Zambia's Ministry of Environment, Tourism and Natural Resources. This project consisted out of six components and under component 4, the Wildlife Research, Monitoring and Rehabilitation of Critical Habitats and Species, a budget was made available for the design and testing of a vegetation monitoring system. A consultancy was procured in 2006 and the vegetation monitoring system was designed and tested within the same year.

A number of plots were located throughout the park but in this paper focuses on the six plots within the Ngoma forest which has six plots. In 2008 baseline data were collected from only two of the plots that were sampled in the year 2008, using area based methodology. The two plots were each 20x20 m, and one was located within the Baikiaea forest while the other was on the outside of the Baikiaea forest but still within the Ngoma forest. Data collected included: height, diameter at breast height, species, and position of each plant; whereafter values for species diversity, importance values, shrub biomass, tree biomass and crown cover were calculated for each plot.

The plot (08-12) outside the Baikiaea forest had a Shannon index of 1.42, total shrub biomass of 1,563.64 tonnes ha^{-1}, total tree biomass of 705.36 tonnes ha^{-1} and crown cover of 326.92. The second plot (08-13) which was located inside the Baikiaea forest had a Shannon index of 2.31, total shrub biomass of 467.56 tonnes ha^{-1}, total tree biomass of 794.28 tonnes ha^{-1} and crown cover of 286.49. *Combretum collinum* and *Friesodielsia obovata* had the highest importance values of 12.55 and 43.18 in plots 08-13 and 08-12 respectively. Since these plots have now been established, it will be possible to go back after some years and determine if any changes have occurred as well as the likely reason for the detected changes.

NOTES:

PLATFORM PRESENTATION: INFLUENCE OF GRAZING MANAGEMENT ON PLANT DIVERSITY OF HIGHLAND SOURVELD GRASSLAND, KWAZULU-NATAL, SOUTH AFRICA

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Commercial livestock production offers one of the main opportunities for 'mainstreaming' of biodiversity conservation in the grassland biome of South Africa. Grazing management is expected to influence its success. Using three long-term (15, 13, and 9 years duration) grazing trials, effects of stocking rate and cattle-to-sheep ratio on the plant composition and diversity of Highland Sourveld grassland in KwaZulu-Natal were examined. Plant diversity was sampled using modified Whittaker plots. Data were analysed with canonical correspondence analysis and general linear models of individual species' responses. In a biennial rotation, burned/grazed plots supported lower species richness of forbs and all plants than unburned/ungrazed plots, attributed to the impact of grazing during the season of occupation. A high stocking rate resulted in a long-term decrease of forb richness in one experiment but an increase in another. An increasing proportion of sheep to cattle resulted in a long-term decrease of the richness of forbs and of all plant species. The three trials identified non-grass species which behaved as increasers or decreasers in response to an increase in stocking rate, and a set of species which behaved as decreasers in response to an increasing proportion of sheep to cattle. Constraints on using long-term trials for identifying the effects of livestock management on plant diversity include lack of baseline data, limited replication, pre-experimental impacts on the study site, and the difficulty of assessing uncommon species.

NOTES:

PLATFORM PRESENTATION: MEDIUM-TERM CHANGES IN THE VELD CONDITION AND GRAZING CAPACITY OF THE DOORNKLOOF NATURE RESERVE IN THE NORTHERN UPPER KAROO VEGETATION

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Medium-term (13 years) changes in veld conditions and grazing capacity in the Northern Upper Karoo vegetation in Doornkloof Nature Reserve (DNR), were monitored and analyzed in relation to biotic (grazing) and abiotic (rainfall) factors. Vegetation monitoring is a tool used to assess the veld's potential condition as per habitat and soil unit characteristics. A thorough understanding and assessment of changes in vegetation form the basis of reserve management decisions like game species composition and stocking rates. Vegetation management is specifically aimed towards improving the veld's condition through maintaining species diversity, improving species composition and maintaining abundance and resilience of species. In 1995, a total of twenty monitoring plots were established on slopes, plateaus and plains, aimed to detect vegetation changes through measuring species canopy cover, veld condition scores (VCS) and grazing capacity (GC) estimates. VCS can be simply defined as a measure of the state of health of a sample of veld. GC is considered to be the average number of grazing animals that a particular area will sustain over time. Surveys were conducted bi-annually and were conducted using the line transect method (Strikes-and-Misses) which specifically concentrates on the herbaceous layer, particularly grasses, rather than woody components. Parallel line transects of 25 m in length (25 points per line), were spaced 3 m apart (25 m x 25 m plot size) to record 250 points.

The VCS of both summer and winter seasons showed great improvement, the summer dataset VCS increased from 242.2 (1995) to 394.9 (2001) and 432.2 (2008) and the winter dataset VCS increased from 212.9 (1995) to 386.3 (2001) and 427.3 (2008). The current average grazing capacity of the veld is 17 ha LSU^{-1}. Large stock units for DNR amounts to 495.4 LSUs and a carrying capacity of 582.7 LSU. There is a great improvement on the veld condition, resulting in increased grazing capacity. These changes can be attributed to dominance of slopes by good grazing grasses species such as *Themeda triandra*, *Sporobolus fimbriatus* and *Heteropogon contortus*. It can be concluded that reduction in game numbers may have a positive influence on the VCS and GC. Conclusively, the management objective of establishing the monitoring plots was achieved, veld condition has improved and veld management is at practice.

NOTES:

POSTER PRESENTATION: ESTIMATING THE POPULATION DENSITY OF THE THREATENED PLANT SPECIES *ALOE PEGLERAE* IN THE MAGALIESBERG MOUNTAIN RANGE

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This study forms part of an MTech project titled "The population status of the threatened plant *Aloe peglerae* in the Magaliesberg Mountain Range". *A. peglerae* Schonland is a rare and endangered succulent plant species of the family Asphodelaceae, which is endemic to South Africa and is confined mainly to the Magaliesberg Mountain range extending a 100 km cross-boundary between Pretoria (Gauteng Province) and Rustenburg (North West Province), with outlier populations near Krugersdorp and on the Witwatersberg. The *Aloe peglerae* plant species has specialized habitat requirements, and is currently found in small fragmented populations throughout its natural distribution range.

This study is a continuation of a project initiated by the Gauteng Department of Agriculture, Conservation and Environment (GDACE). The project was initiated in 1999 with the aim of determining the impact of humans on *Aloe peglerae* populations on the Magaliesberg Mountain Range. The entire area of the Magaliesberg was systematically searched for populations of *Aloe peglerae* and ten sites were found. The site situated on the Peglerae hiking trail, in Kgaswane Mountain Reserve (Rustenburg), was later excised from the study as there were no specimens of *Aloe peglerae* found during the field survey in the year 2009. Of the nine sampling sites, six are located in the Gauteng Province, while three are located in the North West Province.

The aim of this study was to determine the current status of the sampled populations; whether the populations were declining, stable or increasing. It involved using distance sampling methodology, specifically the line transect sampling technique. The 1999 sites were re-surveyed which entailed visually searching for *Aloe peglerae* specimens on either side of the transect line and recording the perpendicular distance from the line to each detected plant. Ancillary data such as population size structure, number of flowering individuals and potential threats to the species were also recorded. Data were analyzed using the software package Distance 5.0.

Preliminary results show that the population appears to be stable at only two sites, i.e. sites 2 and 10, which showed a percentage increase in estimated population density, of 13.63% and 25.66%, respectively. Populations at all the other sites have declined ranging from 11% for site 3 to as much as 58% for site 4. Further statistical testing also showed a significant percentage decline, of 31.6%, in mean population density over the 10-year period ($P = 0.05$, d.f. = 8). A follow-up season of fieldwork will be undertaken from July to August 2010.

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