Lowveld Protected Areas: To Manage or Not to Manage

Mike Peel
Agricultural Research Council
Rangeland Ecology Group
mikep@arc.agric.za

As we are all aware, the Lowveld has experienced average to above average rainfall over the past six years. During these 'years of plenty', with the veld looking great, we are often numbed into a false sense of security and as game numbers increase, we try to create a sense of 'anticipatory awareness' - the dry times will return and we cannot predict when, how long and what the severity of the dry period will be when it comes. In fact it appears that with increased variability in climatic conditions, prediction may become more and more difficult.

The Rangeland Ecology group of the Agricultural Research Council has, over many years, presented potential animal trend scenarios to a large number of land users based on current veld condition and animal numbers (both based on up to 25 years of historical data) under varying rainfall conditions and with the predicted response of the grass layer to these variables. The bottom line is that we do not want unpleasant surprises and we need to be proactive rather than reactive when taking management decisions relating to animal numbers. In the following discussion I share some thoughts relating to animal management under fluctuating environmental conditions.

The fact that, due to land fragmentation there is no longer movement to the higher rainfall areas and forage resources in the west near the Drakensberg range, means that there will be animal losses in drought years. Population declines especially in larger grazer species such as buffalo, zebra and wildebeest would vary from minimal through steep as evidenced by the 1982-83 drought for example where some grazers were reduced to between 10 and 20% of their pre-drought numbers following large scale perennial grass mortality. Mortality amongst these grazing herbivores may be viewed as part of a longer term cycle and droughts are also times when predators, in particular lions, feast on weakened animals.

The question is whether or not we are prepared to allow drought related mortality to occur and whether the cost to the veld would be acceptable if numbers are allowed to increase unchecked*?* Management decisions are also linked to whether the protected area is fenced (no movement to favourable grazing areas possible) or not.

The relationship between grass production and standing crop is highlighted with recent favourable rainfall seasons in the eastern Lowveld (mean or above rainfall since 2008/09 in the example given below) resulting in an increase in grass standing crop (the portion of production that remains after utilisation) (Figure 1). The latter is due to a favourable perennial composition and cover and improved soil moisture conditions that promote grass growth (Figure 1). This has in turn resulted in a steady increase in herbivore numbers in Lowveld Protected Areas (Figure 2) which largely reflects these favourable grazing conditions.

Figure 1 illustrating the favourable relationship between annual rainfall and grass standing crop (note mean or above mean rainfall since 2008/09 and above or above average grass standing crop since 2009/10 – note lag of one rainfall season before the grass response becomes clearly evident.

Figure 2 illustrating trends in three grazing species in the protected areas of the eastern Lowveld. Note the increases in these important grazers in response to the data shown in Figure 1 (increased rainfall and increased grass standing crop from around 2008/09 and linked increases in grazing animals).

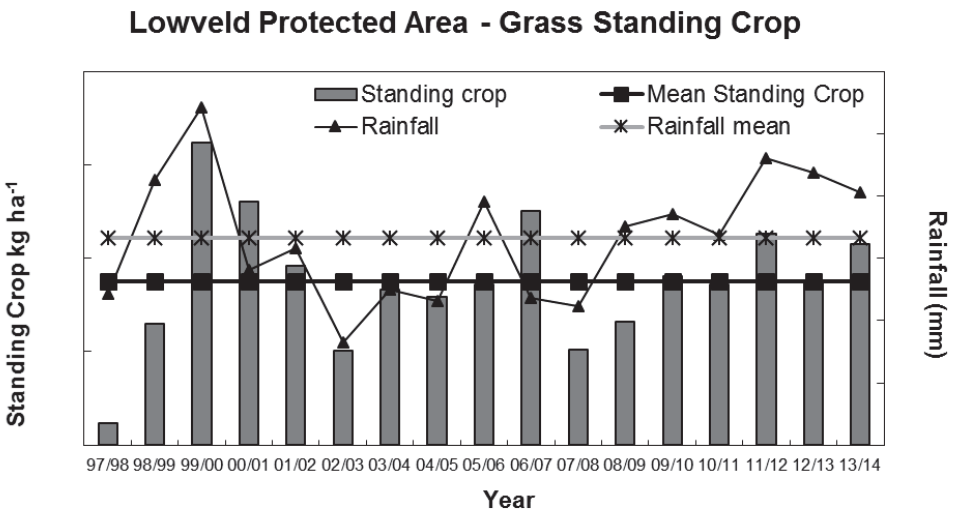

Figure 1 illustrating the favourable relationship between annual rainfall and grass standing crop (note mean or above mean rainfall since 2008/09 and above or above average grass standing crop since 2009/10 – note lag of one rainfall season before the grass response becomes clearly evident.

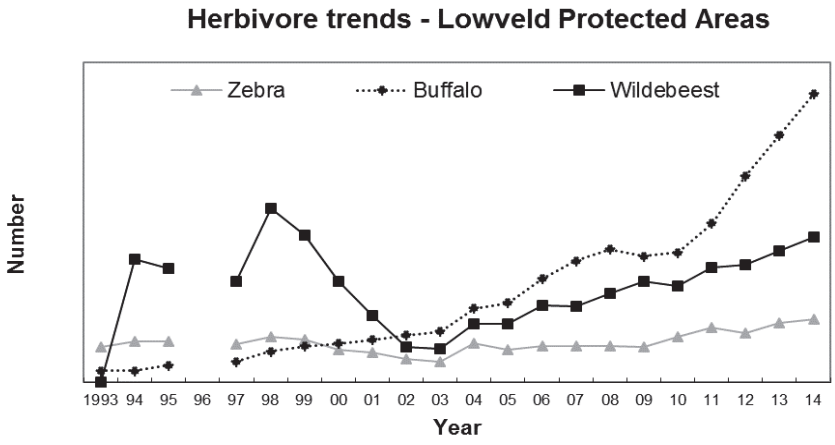

Figure 2 illustrating trends in three grazing species in the protected areas of the eastern Lowveld. Note the increases in these important grazers in response to the data shown in Figure 1 (increased rainfall and increased grass standing crop from around 2008/09 and linked increases in grazing animals)

Over the past few years we can see that the grass layer has not been limiting for grazers in general (Figure 1). Further I think that given the fact that grazers, like buffalo, move in large herds over extensive areas and are not sedentary around a single water point, that they have a generally beneficial effect on the vegetation for, among others, the following reasons. High densities of large hooved animals:

- Break soil crusts by their hoof action allowing for a good soil surface to seed contact;
- Reduce the height of moribund grass, thus allowing sunlight to penetrate the shorter vigorous grass tufts while reducing the temperature of the soil and making it more suitable for rai fall infiltration; and
- Deposit concentrated amounts of dung and urine

All of the above promotes seedling establishment, particularly in bare areas and promotes a healthy productive perennial sward of grasses. Closer plant spacing (increased density) with a better litter layer (organic matter) and stable soils results in less evaporation and more effective rainfall (infiltration) with lower soil temperatures, less rainfall runoff, silting up of streams etc. The presence of predators, in particular lions, causes buffalo herds to bunch when chased thus intensifying the positive impacts outlined above.

The fact that these large herds are mobile also means that they seldom 'camp' on a patch for a long period of time but are continually moving through different landscapes. This means that unlike selective water dependent grazers, buffalo will utilise an area and then move on thus reducing the chance of overgrazing (a function of time and not necessarily number – veld needs rest). For example excessive artificially supplied surface water results in high densities of sedentary water dependent species (e.g. impala). So where and when do we exercise animal control? Even on unfenced areas animal control may need to be considered where water point provision has resulted in increased animal numbers due to their increased distribution resulting in insufficient forage for animals during dry periods (obviously more critical in fenced situations). The alternative is that the population is allowed to fluctuate with the prevailing resource conditions, i.e. a die-off in drought (weaker animals). This may be acceptable in unfenced, 'open' situations but is it appropriate in fenced areas where animals are unable to migrate? The tricky issue if the 'laisser-faire' option is pursued, is the long term effect on the resources resulting from overgrazing.

A hypothetical example from a fenced area – to manage or not to manage

We examine the effect of resource use by grazers by inserting the resource requirements for grazing species and determine whether the grazing population is able to maintain themselves under varying environmental and attendant resource conditions.

For this exercise the model is based on a fenced protected area using real data (main grazers rounded off: buffalo 1 000; wildebeest 550; zebra 250; impala 3 100), year 1 grass standing crop (≈ 1 700kg ha^{-1} which provides some residual for the year 2 season's standing crop) and as a worst case scenario a projected a grass standing crop for year 2 season which yields only 600kg ha^{-1} (approximately the lowest standing crop on the PA in question for some 18 years). The results indicate that there would have been insufficient forage for the grazing animals present on the PA. This information is critical for managers to take early animal management decisions and depending on the amount of risk they are willing to take. Any animal management would be aimed at preventing:

- Excessive animal die-off; and
- Veld degradation.

This situation obviously brings into question the species that we should consider managing. We need to be wary about reducing prey species such as wildebeest and zebra which, in this case are showing encouraging increases (Figure 2). The reason for this caution is that the lion population has the ability to relatively quickly push these and other more sensitive species (e.g. waterbuck) into a predator pit (as happened under high predator levels for wildebeest and zebra between 1997 and 2002 (Figure 2). The latter situation required predator, in particular lion, management – a discussion for another day!). Consideration could be given to the removal of species such as impala but

caution is again advised as impala are an important buffer to other prey populations that may be under pressure. All the while the grazing resource would be stressed. To address this situation the removal of around 20 buffalo would have ensured that there was just sufficient food to satisfy the needs of the grazing population (this is obviously an oversimplification but is used here purely for illustrative purposes).

The reality is that we had a good year 2 season so the stressed grazing situation never materialised. If we feed the year 2 standing crop in (≈ 2 100kgha^{-1}) and project an increase in animal numbers minus predation (actual data obtained from the protected area concerned) and remembering that populations close to 'ecological carrying capacity' do not generally increase at rates attained when a population is increasing with surplus resources (on the fast part – logarithmic part of the growth curve) then anything less than 680kgha^{-1} would result in a shortage of grazing. Note: The point at which grazing stress becomes an issue increases from 600kgha^{-1} to 680kgha^{-1} (assuming reduced animal increment levels for the reasons given above resulting in more grass but still a stressed grazing resource to 'break-even). At 600kgha^{-1} it would be difficult to reduce the number of buffalo alone (in one exercise) to get to the 'break even' point as this number would be projected at around 1 150 to reduce to around 900 (a 10% increase in buffalo from 1 000 is 100! Plus the other species would also increase in number). Is this logistically practical? We need to look at other species as well. In addition, for example, 700 impala could be removed to stabilize the situation. As stated above however we need to be wary to reduce prey species such as wildebeest and zebra (which are both increasing), as well as waterbuck due to their susceptibility to heavy predation.

BUT the above assumes a drought situation and we are coming off a run of good seasons. The good news is there was sufficient grazing and offtakes should be aimed at maintaining this situation depending on rainfall. A staggered offtake is logistically preferable but what I aim to illustrate in this discussion is how quickly 'things can get away'. On fenced areas where the animals cannot move, the situation is even more critical!!

An active adaptive management approach means that in the worst case scenario:

- We suffer a drought
- We lose animals;
- Pressure is taken off the veld;
- Feeding is considered in some cases;
- We recoup something from offtakes.

The best case scenario would be that;

- We do not suffer a drought
- We lose animals through natural attrition
- Pressure is taken off the veld;

- The veld remains in a favourable condition;
- We recoup something from offtakes

In unfenced protected areas there is obviously another option in terms of management, that of a laisser faire or hands-off approach. However, populations cannot increase at consistent rates under stressed conditions so one would expect a drop off in natural increments. So we use adaptive management where opportunities are grasped (allow numbers to climb) and hazards are avoided (large scale die-offs related to veld degradation).

In many Lowveld protected areas the stocking rates are such that it would require a relatively large management effort to reduce the numbers to adapt to any decline in veld condition. As the grazing resource is generally limiting, grazer species in particular require constant monitoring (removal, feeding or no action). These 'managed' animals would be animals not removed by predation but considered necessary for removal for ecological reasons while at the same time being careful not to push prey species into a 'predator pit' and all the while striving to achieve the ecological and economic objectives of the protected area in question.

"Populations cannot increase at consistent rates under stressed conditions"