A walk on the wild side: lessons from the Kruger on wildlife management

Adaptive management in the Kruger National Park

Moving from wide-scale artificial water provisioning to mimicking natural water distribution

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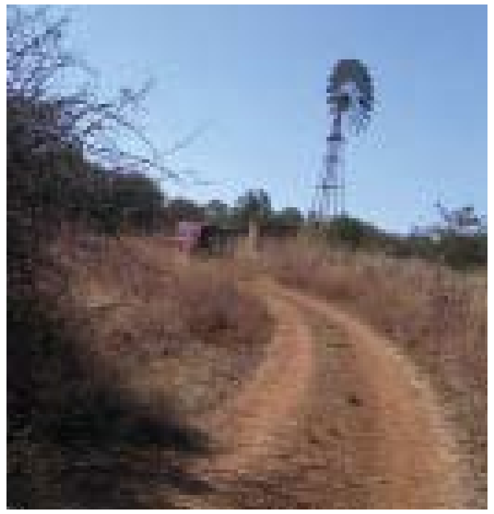
Visitors to the Kruger National Park (KNP) are familiar with man-made or artificial waterholes as they represent prime game-viewing spots. The waterholes include concrete reservoirs and troughs filled by windmills or solar pumps on boreholes, and some dams in perennial rivers, but mostly catchment dams in ephemeral streams (*spruitjies*).



Water provisioning in the KNP started as early as 1911. The common perception (and understandably so) was that the additional water sources were beneficial by stabilising the availability of water for the animals and preventing them from having to migrate in search of water, thus also allowing them to utilise the park more evenly. The widespread droughts of the 1960s and early 1970s were interpreted at the time as progressive desiccation of the Lowveld. It added considerable momentum to the so-called 'Water-for-Game' programme.

The 'Water-for-Game' programme, although creating excellent game-viewing opportunities, unfortunately did not have the desired effect on the park's ecosystem. Apart from the obvious impacts of dams on aquatic ecosystems, it resulted, over several decades, in the following:

- Increases in numbers of general plains game that are water dependent, mainly zebra but also waterbuck, kudu, impala, giraffe, warthog and blue wildebeest.
- Colonisation by these animals of areas previously not suitable for them and a subsequent change of the habitat of rare species to mainly short grass.
- Increased competition with rare species such as sable and roan antelope, eland and tsessebe.
- Increased predation pressure on rare species as the increase in numbers of water dependent animals attracts more predators (especially lion and hyena) to areas where their numbers previously were very low (possibly mainly nomads).
- Increased overgrazing, erosion and land degradation.

Recent research suggests that the elephant population may also have benefitted from the man-made waterholes.

Rare antelope species naturally occur in areas with long grass, generally low densities of other game and low predation pressure. Many of them, including roan antelope, hide their young during the first few weeks after birth and with shorter grass and more predators around, they become more vulnerable.

Combined with the above factors, the effect of the droughts in the 1980s and 1990s caused the rare species' numbers to dramatically decline. Roan antelope, in particular, was hit hard and their numbers declined from approximately 400 to less than 30. Sable antelope declined from around 2 000 animals to about 500 animals. It seems as if the higher lion, leopard and hyena numbers also negatively impacted on jackal, cheetah, wild dog and possibly many other small mammals.

Another problem, specific to catchment dams, is that they accumulate large amounts of silt within a few decades. The water becomes nutrient rich as a result of the silt (also boosted by hippos defecating in the water). This causes outbreaks of toxic blue-green algae, killing animals that visit the dams to quench their thirst. A few dams had to be specifically breached after dozens of animals died after drinking the toxic water.

Time for change

It had become clear that management strategies had to be adapted. There were two options available: the numbers of zebra, lion and hyena could be reduced in specific areas, but that would have been a temporary solution. The other option was to address the real cause of the problem and get a long-term solution by closing man-made waterholes. It was decided that a more natural solution had to be implemented, that would not only create conditions more suitable for the rare species, but would also address other concerns associated with artificial water provision (such as changed hydrology, erosion and toxic cyanobacteria outbreaks).

This decision has been phased in systematically over the last 13 years. The most recent information suggests that there is a turn-around in the decrease in numbers of rare species, with definite signs of them bouncing back.

The necessity of drought in nature

Droughts play a very important role in nature and ecosystems as opposed to their crippling effect on the farming community. When 50% of a specific animal population die during a drought period (as happened to Kruger's buffalo population during the 1990s), the remainder of that population is the so-called 'cream of the crop' that would be able to resist many other setbacks. A phenomenon like drought therefore has a healing and regulating role to play.

KNP's main aim

The primary mission of the KNP is to conserve biodiversity with all its natural facets and fluxes. Experience has taught us that as soon as man interferes, it can easily result in mistakes being made. It is often best to just allow nature to take its course. Therefore, although artificial water provisioning does have a role to play in a fenced-in system, it is increasingly recognised that it also has multiple negative effects on the natural ecological patterns and processes in an area where water availability has always been fluctuating. The new approach aims to address this by creating refuge areas further away from permanent water.

Managing for a wide suite of biodiversity

When the natural distribution of surface-water in KNP is analyzed, it is clear that areas exist where water is always available (perennial rivers), some areas where water is mostly absent except after good rains (basaltic plains) and some other areas where water is sometimes available and sometimes not (seasonal rivers and ephemeral pans) (*Figure 1*).

The wide-scale provision of evenly-spread water by management is undesirable as this brings the whole park within easy walking distance from permanent water, a situation that is clearly unnatural. However, due to the altered nature of the Kruger system (fence), as well as tourist expectations, it is accepted that water provision has to be condoned in certain areas. Kruger management now uses three main principles as guidelines when considering water provision:

- water should not be provided in areas that are naturally dry during dry seasons
- water should not be provided too evenly across the landscape, thus over-riding natural movement patterns and spreading the effects of droughts over larger landscapes
- water should be provided if human-induced constraints affect the availability of water in the park (if rivers running into the park are dry due to human abstraction outside of the park).

Almost two thirds of the more than 300 boreholes have been closed since 1997 (*Figure 2*) and several catchment dams breached and rehabilitated. This is an ongoing process and is managed through a learning-by-doing approach (adaptive management). Additional waterholes are being closed down and dams breached and rehabilitated from time to time, or in some cases disused waterholes will be opened up again.

Artificial water provision should not overrule the natural spatial and temporal water availability patterns that stimulate animals to move and which influence their utilisation patterns between seasons and years.

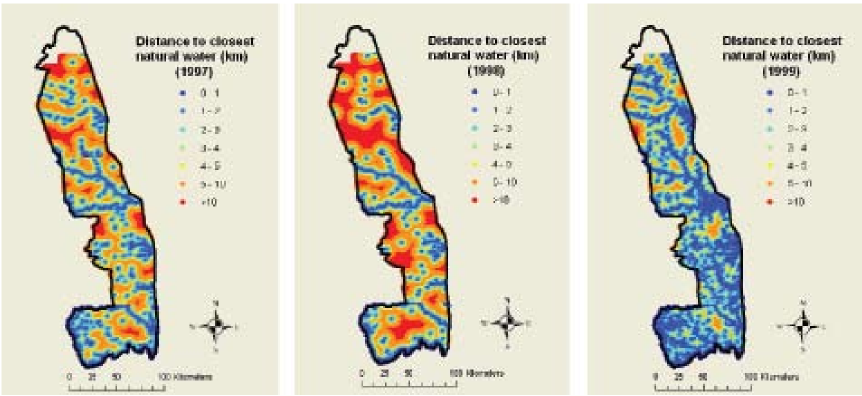


Figure 1: Natural availability of surface water during the early dry season. Note how it differs between successive years that can be classified as normal, dry and wet. This natural variability in water availability allows certain areas of the park to 'rest' from herbivore utilisation during some periods.

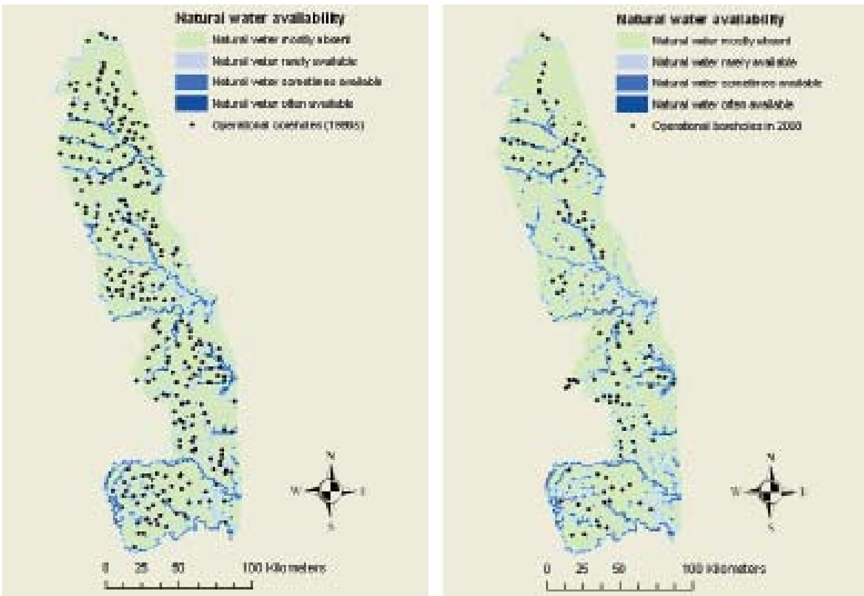


Figure 2: Distribution of borehole-fed waterholes in the 1990s (left) and 2008 (right).