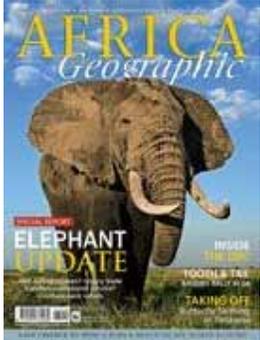


Elephants Revisited (Part 1) Africa Geographic, October 2007



In April 2006, prompted by debates in South Africa about culling, Africa Geographic dedicated an entire issue of the magazine to one species: elephants. In the 18 months since then, things have moved on – culling has been put on the back burner, the trade in ivory dominated proceedings at the recent CITES conference and forest elephants are fighting for their very existence. High time, we thought, to take another look at these great, grey beasts.

The decision to devote an entire issue of the magazine to elephants was spurred by the controversy then raging in South Africa – and gaining international attention – about proposed methods of dealing with what was becoming known as ‘the elephant problem’.

In September 2005, South African National Parks (SANParks) sent a report to the Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk, outlining suggested strategies for managing a growing population of elephants in the Kruger National Park. One of those strategies was to increase elephant mortality through culling – a recommendation that catapulted the issue onto the pages of newspapers in South Africa and across the world, generating vociferous public debate.

Culling had been an accepted, if not especially popular, method of population control from 1967 to 1994, when international and local pressure brought a moratorium to bear. In the decade that followed the cessation of culling, elephant numbers increased and, although SANParks moved away from the notion that the Kruger could only carry a certain number of these great ‘eco-system engineers’, it was none-the-less concerned that increasing elephant numbers could cause irreparable harm to some of the park’s flora.

The minister’s response to the report and the public outcry was to convene the first of several meetings that developed into the Elephant Science Round Table (SRT), which met for the first time in February 2006. The SRT consisted of scientists actively engaged in elephant research, who were charged with answering three questions: are there too many elephants; are elephants causing irreversible damage to bio-diversity; and is action needed to reduce elephant densities?

As the minister deliberated on the panel’s recommendations, popular news reports of carrying capacities, growth rates, the intelligence of elephants, their effects on biodiversity and potential tourism boycotts should culling resume flooded the media and, quite frankly, served only to confuse those of us at Africa Geographic. So, in an attempt to unravel it all, we produced ‘Elephants and us’.

Working with a number of scientists, often with opposing views, we investigated every aspect of elephant biology, conservation and research that seemed to have a bearing on the issues at hand. We discovered, first and foremost, that there is a lot we don’t know. Elephants are surprisingly difficult to count – continent-wide analyses of their distribution and population are incomplete, and southern Africa is the only region where it can be said with any certainty that populations are increasing. Roughly one-quarter of the continent’s estimated 500,000 to 600,000 elephants are thought to live in

Botswana, which puts the Kruger's 'elephant problem' (the park is home to barely two per cent of the entire population) in a slightly different perspective.

We learnt that elephants are water dependent and need to drink at least every 48 hours. They also eat a lot (up to 300 kilograms per day), but their food preferences change according to the season – they tend to be grazers during the wet season, when grasses are lush, and browsers when it is dry, which is when they affect vegetation structure the most. This means that, if left to their own devices, when the rains come and seasonal pools fill with water, elephants migrate to the grasslands. They return to permanent sources of water during the dry season, where they survive on trees. This ebb and flow gives vegetation time to regenerate.

Elephants that are confined by fences, such as those in the Kruger, seem to have smaller home ranges (very often their dry- and wet-season ranges overlap), which they use more intensely, leaving little or no time for the vegetation to recover. The provision of artificial waterholes, again the case in the Kruger, further exacerbates the problem as elephants don't need to travel far between water points, which decreases calf mortality and contributes to population growth.

So, in managed elephant populations where animals are fenced in and prevented from following old migration patterns, and are provided with a year-round supply of water, problems will arise. What are the options? We looked at the pros and cons of culling; we examined whether contraception could work and analysed the costs of moving elephants from over-utilised areas to places where they did not occur. And, finally, we explored the possibilities of range expansion – taking down fences, creating conservation corridors and linking protected areas into a network large enough to allow for more natural migration patterns.

We canvassed opinion from all the NGOs and animal rights organisations that had a stake in the matter, and we took a long, hard look at where the money was going to come from for any or all of the above. The response to 'Elephants and us' was overwhelmingly positive and it has been used by schools, academic institutions, wildlife guides and journalists alike. But, more than 18 months have passed since its publication – what has happened in the world of elephant conservation since then?

EXPANDING AND CONTRACTING

Significant progress has been made in two of the proposed methods of dealing with elephants – range expansion and contraception. Sarah Borchert brings us up to date. At the end of February 2007, having considered the recommendations of 21 scientists and innumerable submissions from the public, the South African Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk, presented the Draft Norms and Standards (DNS) for elephant management. The DNS provides for the control of elephant populations using one or more of the following options: range manipulation; translocation; the introduction of elephants; contraception; and culling. The strategies – known collectively as 'adaptive management' – are listed in order of preference, so although culling is again an option for South African wildlife managers, it is regarded as a last resort and to be 'undertaken with circumspection'.

The minister also committed R5-million (about US\$700,000) to a research project proposed by the Science Round Table that he said would, 'hopefully reduce the scientific uncertainty concerning elephants whilst we continue to deal with our immediate challenges'. To this end, a massive assessment of scientific knowledge is being conducted to determine what is known and – more importantly – what is not known about southern Africa's elephants. Once this is complete (the results are expected in December this year), our understanding of these great grey beasts will be that much clearer, paving the way for directed and relevant research projects.

Space and time

Rudi van Aarde, director of the Conservation Ecology Research Unit (CERU) at the University of Pretoria, is a leading proponent of managing elephants by manipulating the spaces in which they live. This can be done by controlling water supplies (opening or closing waterholes), linking protected areas through the creation of corridors or expanding ranges by acquiring additional land. His thinking is that if elephants are freed from intense interference by humans (principally fences and water-holes), natural checks and balances on elephant populations – namely emigration and immigration, births and deaths – will be restored. This would reduce pressure on vegetation, and concerns about numbers and loss of biodiversity would become less critical.

In the 18 months since Van Aarde and Tim Jackson expanded on 'megaparks for metapopulations' in *Africa Geographic*, the idea has been peer reviewed and has gained ground in scientific circles. In April 2007, Van Aarde was invited to present the concept to some 700 conservationists in East Africa, potentially paving the way for its application there. It is especially significant, given that long stretches of fences are currently being erected around Kenya's Tsavo National Park in an effort to curb poaching and mitigate human–elephant conflict. 'Fences intensify impact,' says Van Aarde. 'A fence has a 15-kilometre range of influence on elephants, and when you combine that with the provision of water, you create undesirable effects over major portions of relatively small, fenced-off conservation areas.'

In southern Africa, the team at CERU now aims to garner the necessary political support for megaparks for metapopulations. This has involved identifying country-specific trends and presenting these to the relevant authorities in Namibia, Zambia, Malawi, Botswana and Mozambique. These efforts will be extended to include elephants living in Zimbabwe and Angola, thereby encompassing a total population of some 280,000 animals.

Satellite tracking data from elephants collared by CERU throughout the region is being collated, and a vast database of elephant numbers as well as trends over time is being developed. The picture that is emerging is mixed – some elephant populations seem to be increasing, others are decreasing and a surprising number have stabilised. In Zambia, most populations are declining, have high incidences of tusklessness and contain relatively few old individuals. CERU ascribes these findings to poaching at levels far higher than those reported by Zambian authorities. In Botswana, which is thought to harbour a quarter of the continent's elephants, the population appears to be levelling out. The same is true for the population in Zimbabwe's Hwange National Park, the focus of similar discussions to those concerning the Kruger National Park.

In order to create a 'big picture' of all these results, Van Aarde's team has had to prove that the elephant populations in question were all connected. 'Two years ago, we were speculating,' he says. 'Now our research is supporting our predictions.' Satellite collars placed on six elephants in the Caprivi Strip have delivered particularly interesting results (see map). Each one has spent time in at least two of the following countries: Angola, Botswana, Namibia and Zambia. In other words, they don't belong to any one country.

Similarly, as the national boundary fence between the Kruger and Limpopo national parks has been removed as part of the Greater Limpopo Transfrontier Park development, elephants have started drifting from South Africa into Mozambique. After the most recent count, SANParks authorities reported that 660 animals had moved of their own accord. 'Unless a population is fenced in, it is not a defined unit in southern Africa,' declares Van Aarde. 'Elephants don't have passports.'

CERU's work also shows a clear influence of numbers on reproductive output – as populations increase, so breeding rates slow. Additionally, the droughts that are so typical of the region's savannas have a significant impact on the survival of both juveniles and adults. These tendencies may explain why some elephant populations are levelling out. On the other hand, in areas where fences block dispersal movements and waterholes encourage large concentrations of animals, populations may continue to increase despite the deteriorating condition of the veld. Van Aarde concedes, 'We clearly still have a long way to go to unravel all the mechanisms that explain the dynamics of elephant populations and the impacts they have under certain conditions on other species.'

Baby steps

Immuno-contraception, or 'putting elephants on the pill' has generated its fair share of debate and controversy. Placed at the other end of the spectrum to the manipulation of space, it is a population control strategy that requires a high degree of interference from managers. As such, critics have questioned the behavioural effects of low or zero birth rates on elephant society and there are concerns about the high costs and practicalities involved in delivering the vaccines year after year. In 2005, in an article published in *Pachyderm*, Ben Bokhout also raised the possibility that the contraceptive vaccine derived from pigs, porcine zona pellucida or pZP, could introduce new diseases to vaccinated animals.

In the Greater Makalali Private Game Reserve in South Africa, a long-term study of pZP has been under way since May 2000. In a report released in September last year, elephant researcher Audrey Delsink, together with J.J. van Altena, Douw Grobler, Henk Bertschinger, J.F. Kirkpatrick and Rob Slotow, presented findings that could have great significance for wildlife managers considering this option.

Firstly, does it work?

The elephants in Makalali are free-ranging, but fenced, and the population of 73 animals is well-studied and can be individually identified. The programme began by administering the vaccination to all adult females within the reserve (pZP is delivered remotely – either on foot, or from a vehicle or helicopter – and in the first year, requires two boosters at two to three-week intervals, followed by an annual booster shot). Two years into the programme, 17 animals had given birth, but it was determined that 14 of the cows were pregnant at the time of their first vaccination. (The other three were given their first vaccinations after the birth of their calves.) This means two things: pZP doesn't affect pregnancies already in progress and cows are prevented from conceiving from the time of the initial dose. During the course of the seven-year study, the growth rate, which stood at around 8.9 per cent between 1996 and 2000, fell to zero. So, yes, pZP can limit population growth rates, which eventually affects population size.

But what of the potential behavioural side-effects?

During the hormonal oestradiol trials in the Kruger in 1998, researchers noticed increased harassment of cows by bulls, an unusually high incidence of calves being separated from their mothers and evidence of decreased milk production in cows. The conductors of the Makalali pZP study therefore paid particular attention to the medium- and long-term effects of its use.

Delsink and her colleagues observed no change in bull hierarchy or cow selection, nor any abnormal herd fragmentation or alterations of the matriarchal group. Cows were not separated from their calves. Because the vaccine does not prevent oestrus (only conception), cows continue to come into heat and bulls continue to mate with them. Because fewer cows were pregnant, there was a slight increase in incidences of oestrus, but nothing that the researchers regarded as significant.

In fact, the greatest impact on elephant behaviour occurred during the darting operations, which resulted in varying degrees of social disruption, depending on the mode of delivery (vehicles versus helicopters). These disturbances, however, were temporary and, over five years, there seemed to be no permanent changes to the elephants' ranges or their attitude towards vehicles in general – an important consideration for reserves that rely on ecotourism.

How expensive is it? In 2005, implementation costs were around R1,000 (US\$140) per elephant per year, including darts, the vaccine, helicopter hire and veterinary assistance. Of these, the helicopter is the most expensive component of the exercise. A 'one-shot' vaccine is currently in development that aims to combine the first three vaccinations and release long-acting pellets at one, three and 12 months. The first booster would only be required in the third year of contraception, which would cut delivery costs substantially as well as reducing levels of disturbance to the animals.

However, Delsink and her co-authors have warned that, despite these encouraging results, contraception should be regarded only as a method of stabilising or reducing growth rates – it cannot reduce the size of a population in the short term. Furthermore, they suggest that not all females should be vaccinated indefinitely, as this might have negative effects on the social wellbeing of the herd as well as the population demography.

TURNING UP THE HEAT

Human–elephant conflict continues to be a hot topic in East and southern Africa, generating almost daily reports of destroyed crops and loss of human life, with all the direct and indirect costs that those calamities entail. According to a WWF report, Kenyan wildlife authorities kill between 50 and 120 elephants a year as a result of threats to humans and crops. In the Zambian town of Livingstone, human–elephant clashes are making the news as more people move to the town and settle close to the borders of the Mosi-oa-Tunya National Park. And, although recent analyses suggest that Botswana's sizeable elephant population may be stabilising, the animals in northern Botswana have, according to a 2003 study by researcher Michael Chase, 'extended [their range] south and west by 24 per cent over the past 10 years', something that has brought them into closer contact with humans.

As John Hanks reported in April 2006, mitigation measures include the erection of fences, sisal barriers, chemical repellents and the construction of buffer zones between fields and protected areas. Much has been made of chillis – they are unpalatable to elephants and can be ground and mixed with dung to create a brick. When burnt, the brick gives off capsicum-laden smoke that irritates the mucous lining in the elephants' trunks, something they don't like and will avoid. The technique is catching on, with farmers in Zambia, Tanzania, Ghana, Gabon, Congo, Botswana, Mozambique, Namibia and Swaziland all giving it a go.

Researchers Fritz Vollrath and Iain Douglas-Hamilton are also looking into the potential application of aggressive African bees, which they believe can be used – profitably – to protect crops. However, while no one questions the devastating consequences of a run-in with an elephant, it is safe to say that the issue is highly charged and politicised. It is estimated that elephants may only be responsible for 20 to 25 per cent of all reported incidents – and they can and are used as leverage by communities, wildlife authorities and politicians.

A particularly extreme example of this was played out in the Zimbabwean press earlier this year. In March, a British tourist and her daughter were killed by an elephant in Zimbabwe's Hwange National Park, which led to reports in the local media about plans to cull Zimbabwe's 'growing' elephant population amid assertions that carrying capacities had been exceeded. Not only has doubt been cast on these statements by conservation groups who claimed that no census had been conducted for seven

years (in fact, some research suggests that Hwange's population is stabilising), but in light of Zimbabwe's subsequent calls to resume its trade in ivory, it becomes easy to question the motivation behind such reports. During the CITES conference in June, allegations were made by The Zimbabwean, an online publication based in the UK, that the government had been bartering its ivory stockpiles for Chinese military hardware, adding grist to the mill.

If conflict between humans and wildlife of any kind is to be addressed meaningfully, then it is certainly worth understanding the broader social background to the problem. As Rudi van Aarde comments wryly, 'As a politician, you can't promise to do anything about, say, drought, but you can promise to do something about elephants.'