

How many is TOO MANY?



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How many elephants can any given area support? Current thinking suggests that this perennial debate which tends to dominate elephant conservation strategy, particularly in southern Africa, is somewhat irrelevant. The real answer is that 'it depends'. And for **Rudi van Aarde** and **Tim Jackson** the real debate should rather be about the more complex issues of space, water and food relative to elephant populations.

Impact is complex and difficult to define. Elephants are a highly interactive species and, by their very nature, they change landscapes. This is not the problem. The continuing transformation of landscapes is in fact desirable. However, in protected areas that are fenced, the elephants cannot move out of transformed landscapes as they would in unfenced environments, allowing the landscape to recover. In addition, aspects of human aesthetics come into play: people *like* woodlands and resist their alteration into grasslands. Most of Africa's elephants live in savannas that change continuously. Tree-studded grasslands may prevail in some places and for some time, while at other times and places woodlands thrive. Ecologists suggest that rainfall, fire and herbivores drive changes in savannas and we expect that elephant numbers will respond to these changes. Elephant numbers, therefore, seldom remain constant for long – more often they increase, or decrease, with time. As a result, elephant densities (the number of elephants per unit area) vary greatly across savannas – values may be as low as 0.1 elephants per square kilometre or as high as 3.0.



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ABOVE Impact is not all about numbers, but more about the way elephants use their land. In some areas where numbers are low, impact may still be high and vice versa.

LEFT Elephant breeding herds often concentrate at water, where they can be counted with relative ease, as is the case here at Khaudom. The story is very different when they are feeding away from water. Surveys then rely on aerial counts which seldom return accurate estimates.

As elephant numbers increase and they begin to deplete food and water resources, births may decline and deaths rise. Our recent research supports the view that births can decline with density. Such breeding changes, probably in response to food shortages that may be more prevalent during droughts, impose natural limits on numbers.

When food is less readily available, the impact of elephants on their surrounds may be huge, as they literally eat themselves out of house and ►

Getting to the root

More important to elephant management than our obsession with numbers is an understanding of the mechanisms that provide these numbers in the first place.

For example, northern Botswana in particular and the Kavango–Zambezi area in general represent prime real estate for elephants. Supporting more than 180 000 individuals, this area represents Africa's elephant heartland. Yet only 100 years ago elephants were rare in this area after excessive hunting. At the same time, the rinderpest pandemic that swept through Africa killed countless ungulates and severely reduced their populations.

These disturbances spawned woodlands and riparian forests. Inevitably, ungulate and elephant populations increased in response to conservation measures. The ecosystem changed accordingly – browser numbers increased and tree numbers started to decline. Today the woodlands that sprang up are being converted back into scrublands and riverine forest areas are being reduced.

Far from representing an ecological disaster, this actually shows nature recovering from the human-induced disturbances that gave rise to the development of these woodlands in the first place. Humans killed elephants that ate the bigger trees and inadvertently introduced the rinderpest disease that killed the browsers which fed on tree seedlings and saplings. Riverine forests developed in response to these changes. Wishing to maintain these woodlands by culling elephants is therefore wishing to maintain evidence of our disruption of nature – this could hardly be considered conservation!

Understanding the root causes of the so-called 'elephant problem' will, in many instances, lead us away from having to address numbers *per se* through culling, translocation or contraception. Instead, it will allow us to focus on reinstating factors that make for more natural population limitations.



Elephants debark trees, often at the end of the dry season when sugars stored in the roots are migrating towards the budding leaves. On some trees these scars heal, on others they give insects an opportunity to bore into the wood.

It doesn't add up

With increasing elephant numbers in southern Africa has come a concern for the impact that they may have on their habitats. In the popular media, reports on elephants invariably highlight numbers that are often alarmist regarding the consequences they will have for biological diversity. All too often we see media quotes along the lines of: '150 000 elephants are trashing once-beautiful reserves in parks north of the Limpopo', or that 'Kruger National Park has exceeded its carrying capacity by over 5 000 elephants'. In November 2005 the *Zimbabwe Herald* quoted that 70 000 elephants were living in Hwange National Park, yet scientists working there at the time reported a maximum estimate of only 45 000.

Where do these figures come from? The answer lies in the way agricultural thinking has influenced the management of natural ecosystems, that is, animal numbers need to be kept constant.

Adding grist to the mill, SANParks recently stated that the Kruger's elephant population is growing at a rate of seven per cent a year – in other words the population is predicted to double every 10 years. Another interpretation of the same data suggests that the population is growing at 4.1 per cent per annum, which means that the population would double within 16.7 years should conditions not change. If we cannot agree on the numbers we are dealing with in the first place, it is small wonder that debates surrounding elephant management are clouded in uncertainty.

home. In some places, however, elephants destroy plants even when densities are low. Perhaps this is the case in Kruger, where there are only about 0.6 elephants per square kilometre? Impact at low densities is not unusual, especially when fences restrict elephants or water modifies their use of parks. In Etosha National Park in Namibia, where elephant density is only about 0.1 per square kilometre, impact is especially severe around waterholes. Similarly, in South Africa's Tembe Elephant Park, which also has 0.6 elephants per square kilometre, at least five of the tree species eaten by elephants are declining. On the other hand, researchers working in Botswana's Chobe National Park, where elephant density is higher, recently concluded that there is no ecological reason to alter elephant numbers artificially. It therefore follows that impact is not directly linked to numbers, and so it is unwise to use impact to make judgements about numbers.

Over the past 40 years 230 scientific studies have reported on the impact of elephants on plants and other species. At least half of these concluded that elephants harmed other species. The remainder reported either neutral or even positive effects of elephants. The fact that only a few of the studies meet today's criteria for sound ecological comparisons is no reason to

reject the obvious conclusion that elephants do alter vegetation and habitat. We expect this, as elephants are large and need abundant plant material to survive. However, without elephants there would also be a change in species and their habitats. So both their presence and their absence change the environment – neither extreme is desirable. The question we need to answer is: how many elephants would be the right number?

The ecological mindset states that numbers should fluctuate. In an ideal situation, setting numbers should not only be the outcome of differences between births and deaths, but also differences between immigration and emigration. This notion is far removed from the more traditional approach that steered conservation management to fix numbers at a specific level, an approach that has its roots in agricultural practices. This agricultural mindset no longer dominates conservation.

In essence, when addressing 'too many' we are not tackling elephant numbers *per se*, but their impact. Yes, numbers do influence impact, but more important is the way that elephants use space and the consequences this has for management. Dealing with elephants in isolation of the implications that space and resources have for them makes no sense. ■



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Both bulls and cows strip trees of their bark (in fact bulls also knock trees over), which leaves them with little protection against hot fires.