

# The big picture

There is yet another way to manage elephant populations. At the University of Pretoria, the team from the Conservation Ecology Research Unit (CERU) is working on a framework that aims to restore the natural checks and balances that regulate elephant populations. Rudi van Aarde and Tim Jackson explain CERU's approach to the elephant 'problem'.

**F**ree from intense human influences, elephant populations are controlled naturally – they are born, they die and they move in and out of areas. This ebb and flow, a dynamic process rather than a static situation, maintains an overall status quo. However, elephants exist in a world irretrievably altered by humans. We have brought them to the brink of extinction, we have encroached on their land, manipulated water supplies and we have confined them to protected areas (very often to save them from ourselves). Now, in parts of southern Africa, we are concerned about numbers, about 'too many elephants'. We've proposed solutions to this problem that range from killing elephants to limiting their birth rates. As varied as these options may be, they are all labour-intensive and costly.

But what if there were another way? What if we could restore that natural ebb and flow? Elephant populations could then limit themselves more effectively, and concerns about overpopulation and loss of biodiversity would become far less pressing. Pie in the sky? At CERU, we have been exploring ways to do just that.

## BACK TO BASICS

Two sets of factors – births and deaths; and emigration and immigration – determine the size of elephant populations. It stands to reason that when more animals are born than die, the population increases; when more elephants immigrate than emigrate, the population increases. If we understand what causes increased birth and immigration rates, we can incorporate these insights into elephant management strategies.

Drought is one of the major factors affecting elephant births and deaths.



Perhaps the most well-documented case comes from Tsavo National Park in Kenya, where some 6 000 of the estimated 25 000 elephants in the park's eastern sector died during a drought in 1970. When times are dry, the hardest hit are youngsters – those under 12 years old. In Zimbabwe's Hwange National Park, 86 per cent of the elephants that died during the droughts of 1980 to 1984 were younger than 12. In southern Africa, major droughts typically occur every 10 to 12 years, so most elephants will experience the effects of a dry spell before they reach puberty and not all will survive. It is also thought that fewer calves are born during such times, which limits population growth further.

On the face of it, providing additional water to tide elephants through the annual dry season or through periodic droughts is a good idea. Not only are elephants saved from dying of thirst, waterholes provide wonderful places for visitors to sit and watch animals. Ironically though, these waterholes can prove disastrous for wildlife and

conservation. In times of drought, animals can become reliant on those water sources and return to them regularly. During the dry season in Etosha National Park in Namibia, elephants use areas within four kilometres of the waterholes, even though these account for 14 per cent of the park's total area. In some places they have reduced the amount of food in the immediate vicinity. Eventually food can become critically low and elephants will starve. In Tsavo they died of hunger, not thirst.

## COMINGS AND GOINGS

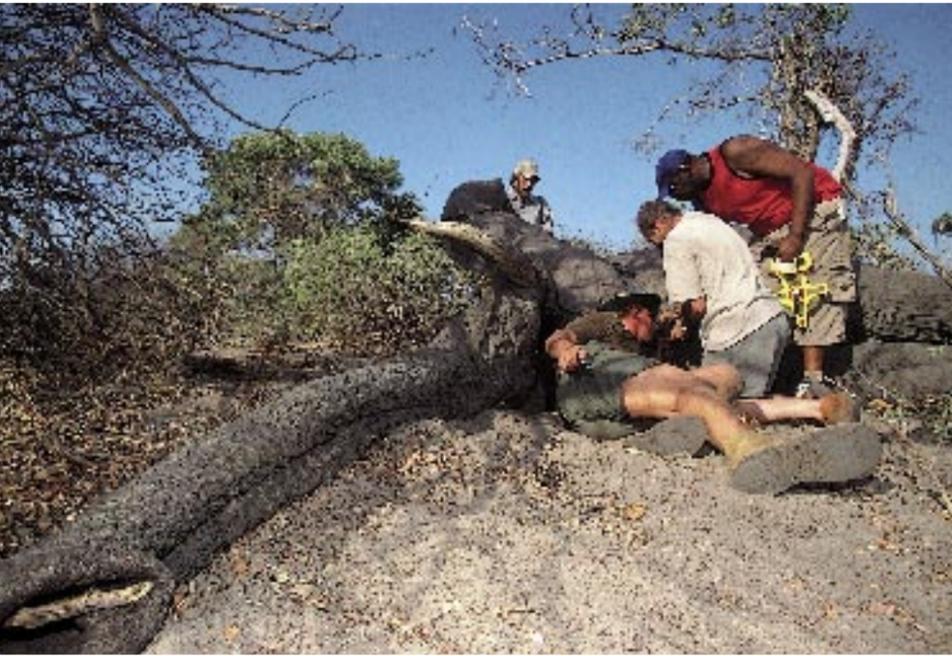
Waterholes have another negative impact on vegetation. Without year-round water supplies, elephants tend to move between distinct wet and dry season ranges – seasonal migration (see page 30). When water points are added, even when there is no drought, elephants may remain in the same location, feeding in the same area throughout the year. With no relief from elephant appetites, the impact ▶



RUDI VAN AARDE (3)

**ABOVE AND TOP** Man-made waterholes in Etosha and Hwange national parks attract elephants and other wildlife that otherwise may not have been in the region. Traditionally, only a few elephants lived in Etosha, but now they remain in areas that are without water for much of the year, exacerbating the local impact on plants.

**LEFT** Elephants are susceptible to droughts, which can cause deaths and limit populations. Providing water may interfere with this process and can induce degeneration of vegetation.



RUDI VAN AARDE

A neck collar is attached to a tranquillised elephant cow in north-western Botswana. The collar contains a GPS unit that allows scientists to follow the elephant's exact whereabouts remotely for up to two years, providing new insights into the way that management and the environment influence land utilisation by elephants.

on vegetation becomes quite obvious. Removing or reducing the number of waterholes would alleviate such pressure, but to do this effectively, we must consider how the size, shape and isolation of conservation areas affects elephants' use of dry- and wet-season ranges.

Elephant movements are heavily compromised by both fencing and human settlements. This is seen particularly clearly in Malawi, where many protected areas are surrounded by farms, yet are poorly fenced. Cut off from their traditional dry- or wet-season ranges, elephants seldom venture beyond the confines of areas such as Vwaza Marsh Game Reserve and Kasungu National Park.

To counter such habitat fragmentation and shrinking ranges, we need to provide for and restore movement patterns. Thanks to GPS satellite tracking, we know that some elephants will travel between parks across potentially hostile non-protected areas and we can facilitate such movement by linking those protected areas.

In northern Kenya, a series of corridors connects the reserves of the Samburu-Laikipia complex. This has enabled elephants to expand their ranges. A recent action plan in western Africa proposes the establishment of conservation corridors across national boundaries. This transfrontier initiative appears sensible in a region where parks are small and transfrontier elephant populations account for more than half

the forest and two-thirds of the savanna elephant populations.

Initiatives to de-fragment elephant ranges have received wide support from many governments, national conservation bodies and NGOs throughout Africa. The most ambitious of these – the creation of Peace Parks, Transfrontier Conservation Areas (TFCAs) and African Heartlands – involve cross-border cooperation between nations, which makes sense. Peace and good governance are good for conservation.

### MEGAPARKS

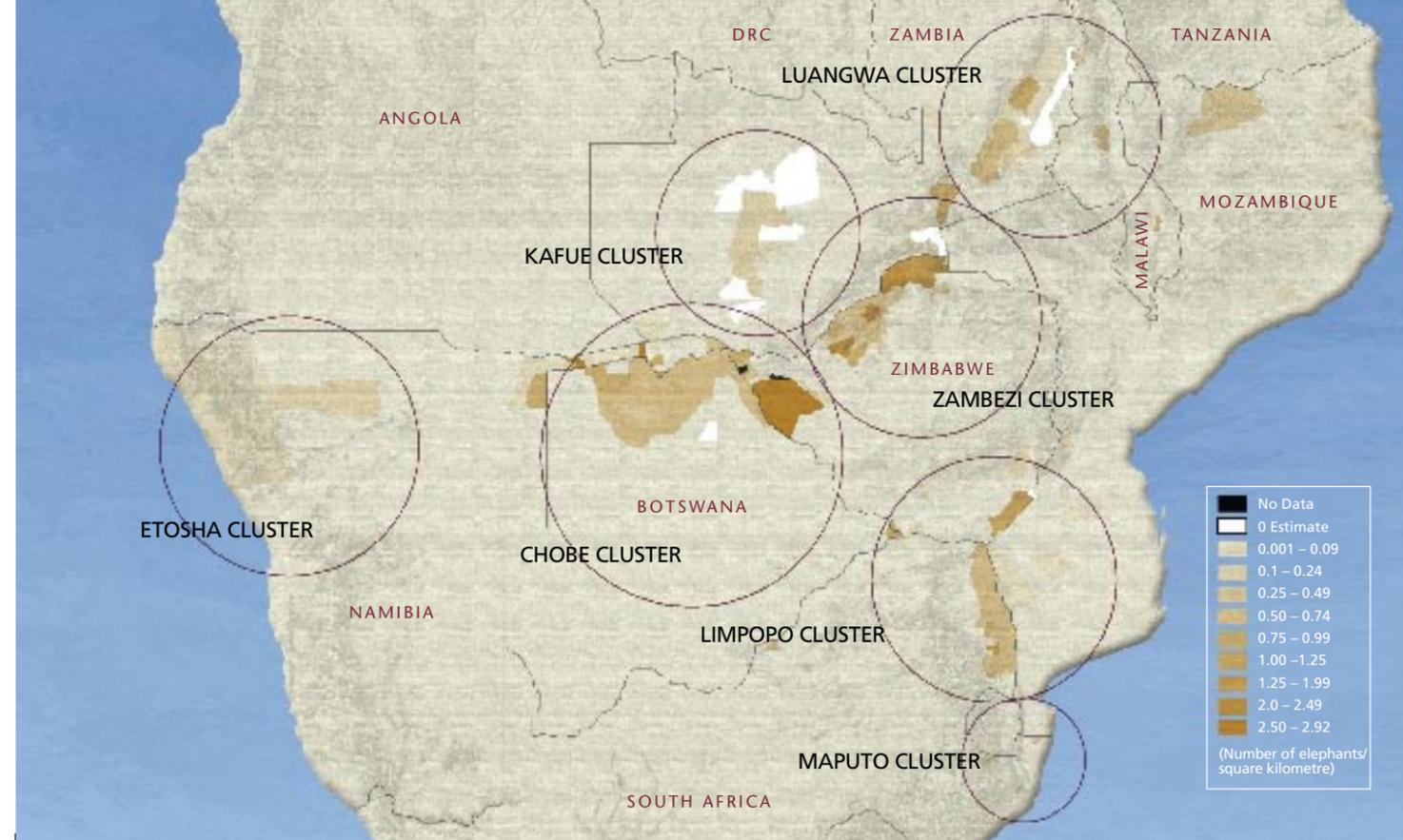
The creation of such 'megaparks' by linking conservation areas, often across international borders, also makes ecological sense. Ecologists view a total species population as being composed of diverse sub-populations, each responding individually to specific living conditions. According to this thinking, some areas are conducive to the increase of a sub-population, while others dictate decline. These increasing and decreasing sub-populations are known as 'sources' and 'sinks' respectively.

If sources and sinks are linked, they can operate as what ecologists consider a 'metapopulation'. One of the benefits of a metapopulation is overall stability – numbers may rise and fall in different places, but in total they remain fairly constant. To create a metapopulation, though, you need an area that encompasses both sinks and sources. At the moment, conservation management in southern Africa allows many populations to operate as sources; with too few sinks it is not surprising that the regional population is increasing.

Establishing metapopulations that encompass sinks changes the situation. They would remove the onus on individual reserves to restrict their elephant populations and would generate the space necessary to normalise range use, thus alleviating the land-use impact of elephants in confined parks. Most importantly, it would restore more natural birth-death and immigration-emigration dynamics.

Constructing megaparks to meet the needs of metapopulations requires the inclusion of both protected and non-protected areas. They incorporate people. Communal and private lands may well serve as sinks, linking source areas such as national parks and reserves.

We argue that there is enough space across southern Africa to allow elephants to wander beyond current conservation



## MEGAPARKS

The idea of megaparks is to create conservation areas that encompass areas where elephants tend to increase (sources) and those where they tend to decrease (sinks) – this creates a metapopulation. Megaparks permit elephants to move freely between these areas and allow 'surplus' animals from sources to be soaked up by the sinks. Thus, while elephant densities are higher in some areas of a megapark, they are lower in others, and overall the numbers remain relatively stable.

In southern Africa the areas that would create megaparks (or Transfrontier Conservation Areas, Peace Parks and African Heartlands) cross several international boundaries. This not only serves conservation,

it fosters better social, political and fiscal relations between neighbouring states. Within the region, seven clusters of conservation areas dominated by elephants have been identified as study areas for the development of the concept. Each cluster represents an area of adjoining conservation areas in which elephant densities and population growth rates vary. At the University of Pretoria, CERU is currently determining just how effective each of these clusters will be in creating regional stability in elephant numbers.

Map compiled by DG Erasmus and Jessi Junker, based on information extracted from a variety of published sources. Protected area outlines from the UNEP, IUCN World Database On Protected Areas (2003).

Establishing megaparks would remove factors that detract from the natural movement of elephants, such as fences and waterholes

areas. Much of the region is relatively thinly populated and many areas have fewer than five people per square kilometre. Urbanisation is increasing and rural populations are not growing as quickly as they once were.

Recently, a broader land-use perspective has allowed the development of a series of Transfrontier Conservation Areas (TFCAs) or Peace Parks in southern Africa. These initiatives have and will substantially increase the size of areas over which elephants can roam. For example, the 20 000-square-kilometre Kruger National Park covers just over half of the core area of the Greater Limpopo Transfrontier Park, which stretches over almost 36 000 square kilometres. When peripheral areas have been incorporated, it will span 100 000 square kilometres. Given this, it would seem short-sighted

to consider managing the Kruger's elephants in isolation from the larger area available.

On an even greater scale, the proposed Kavango-Zambezi TFCA (KAZA TFCA) will extend over an impressive 300 000 square kilometres (that's 20 times the size of Serengeti National Park). This giant TFCA will include 36 national parks, game reserves and wildlife management areas, and will contain the largest continuous population of elephants in Africa (180 000).

This approach allows us to correct some of the historical causes of the high yet fragmented elephant populations we see throughout southern Africa. The establishment of these megaparks would remove factors that detract from the natural movement of elephants, such as fences and waterholes. Instead, we

could allow elephant numbers to change through natural increases in source areas and decreases in sink areas.

This approach does not imply a 'hands-off' style of elephant management, but rather shifts the focus from core conservation areas to the land between them. It provides a model (albeit one that requires considerably more research and development) for the involvement of societies in conservation management. It also moves away from controlling nature to letting nature take control. It helps to generate regional stability and provides a conservation platform that will benefit cross-border politics. It is good for southern Africa internationally, and last, but not least, by doing what comes naturally, elephants become flagships, umbrellas and ambassadors for conservation. ■