

# Elephant engineers

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It is like the premise of a popular home improvement show: in the before photos, the surroundings are undesirable and in the after shot there's lots of attractive spaces to grab a meal, start a family and relax in seclusion from life's stresses. The difference here is that the potential new homeowner is a lizard and the renovations come -- not from a sophisticated Manhattan designer -- but instead from a herd of elephants.

An examination of the connections between elephants and lizards appears this month in the journal *Ecology*, where a researcher reports that the elephants' eating habits have a strong influence on the lizards' habitat choices. The results demonstrate an important and little understood aspect of ecosystem engineering, and may help land managers working on wildlife refuges in Africa.

Working at the Mpala Research Center in Kenya between 2004 and 2007, the author of the report, Robert M. Pringle of Stanford University, found that Kenya dwarf geckos (*Lygodactylus keniensis*) showed a strong preference for trees which had been damaged by browsing elephants (*Loxodonta africana*). In fact, the local lizard population increased proportionally with the number of damaged trees. By contrast, lizards were virtually absent from undamaged trees in the same study area.

Further investigations revealed that the preference was due to hiding places which were incidentally created by the elephants' activities.

Pringle's results are important from a theoretical as well as management

standpoint. Ecosystem engineering -- the idea that activities of one kind of animal can create habitat for other animals -- is a relatively new concept, having emerged only about 15 years ago. When examining such engineers, ecologists would like to predict whether their activities will have a positive or negative impact on the abundance of other species in the same ecosystem. In the past, some scientists have hypothesized that when the engineers (such as the elephants in this case) make a habitat more complex, that habitat becomes more appealing to a larger variety of animals. This research indicates that may indeed be the case in African savannas.

Pringle notes that elephants really “shake up” the savanna landscape. The level of disturbance from a feeding herd is almost akin to that of a tornado touching down; trees and shrubs are splintered, cracked, and fissured and large branches are strewn all over the ground.

“The ripped up trees are like labyrinths compared to the pristine trees, which helps boost lizard densities,” says Pringle. This may be because the twisted crevices in the elephant-damaged trees provide shelter from predators and the harsh arid environment, or because they provide suitable spots for female lizards to lay eggs.

A better understanding of the elephants’ influence on their ecosystem is a particularly pressing need in this region. There are concerns in many parts of Africa that poaching may wipe out the large animals on lands where they are not strictly protected. Elephants, however, eat a tremendous amount, and their eating habits can be especially destructive in smaller tracts of land. Since they have no real natural predators besides humans, they can sometimes eat themselves out of house and home in the areas where they are protected from hunters.

Because of these management dilemmas, finding an “optimum number” of elephants for any given refuge or wildlife area has become a hot

topic. By gaining a better understanding of ecosystem engineering and the effects that large herbivores have on other species, researchers may gain more insight into how the entire savanna ecosystem works.

“If you have no elephants,” says Pringle, “then you’re missing this powerful source of disturbance, since their activities can provide other species with a chance to thrive. On the other hand, if you have too many elephants, then they can actually suppress the abundance of smaller animals by reducing their habitat and out-competing them for food.”

Biodiversity, the researcher says, may well be greatest in the middle ranges of elephant abundance.

Source: Ecological Society of America

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