

OPINION

Treating crop-raiding elephants with aspirin

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Introduction

A man goes to his doctor. ‘Doctor, I suffer from regular daily headaches.’

‘Take two aspirin. That will do the job.’

The next day the patient returns. ‘The aspirin worked. Yesterday afternoon I was fine, but this morning my head aches again.’

‘Take two aspirin, you’ll be just fine.’

A farmer goes to the park warden. ‘Every night elephants come out of your park and into my fields.’

‘I’ll send some game guards to fire a few shots in the air and scare the elephants back into the park.’

The next week the farmer returns. ‘Your men frightened the elephants back into the park, but now they are back again.’

‘Don’t worry, I’ll send some more men to scare them away.’

When the patient returns to complain again about his headaches, the doctor may suggest something stronger: acetaminophen or ibuprofen. But these pills are not curing the problem; they are simply treating the symptoms. Eventually the doctor will realize that he must tackle the causes of the persistent headaches. Perhaps the patient is over-stressed at work, or suffering eyestrain while reading, or maybe he has a brain tumour. After seeking the cause of the headaches the doctor is more likely to cure the patient by changing his work patterns, giving him new glasses or sending him for surgery to excise the tumour.

When the farmer comes again to complain, the warden may prescribe some further measure such as banging drums, burning tyres or installing a fancy alarm system. But these are analogous to the doctor prescribing stronger pills. The temptation is always to throw aspirin at elephants because such palliatives are cheap, they give the farmer the impression of action, and they may indeed scare the elephants away. Well, at least for today. Most attempts to tackle cases of elephant crop raiding are searches for an effective palliative—an aspirin for that particular situation. But the elephants will always return unless a long-term solution is found by addressing the underlying causes of the problem. In the Upper Guinea forest zone the most likely root causes of crop-raiding problems are insufficient habitat within the park and the modified landscape outside.

Carrying capacity for elephants

When elephants forage regularly outside their protected area managers wonder whether resources within the park are sufficient to support the elephant population. Does the current elephant density exceed the carrying capacity of the park? Unfortunately, this is a difficult issue to address, not least because of the question of defining ‘carrying capacity’ (Macnab 1985). For savannah parks one can use equations from Coe et al. (1976) or Fritz and Duncan (1994), but such estimates may have wide confidence limits. At present

we do not have enough data to estimate the carrying capacity of forest habitats for elephants. The mammalian biomass that humid forests can support is much lower than that of savannahs (Barnes and Lahm 1997) and elephants make up a large proportion of that biomass.

It is certainly quite likely that elephants in fragmented forest parks are at greater densities than previously. For example, as the forests north of Cape Coast in southern Ghana were felled during the 20th century, elephants were killed or fled to the largest remaining forest block, which is now Kakum National Park (Barnes et al. 1995). Today crop raiding is a huge problem for the warden of the park.

It is possible that many forest fragments are simply too small for a species that has evolved a large body size that confers low locomotion costs. Elephants have evolved to range widely, and if we confine them in small parks we should not be surprised when they wander outside.

Landscape modification outside parks

Elephants prefer a mixture of vegetation types; a greater abundance of fruiting trees is found in primary forest (Merz 1981), while the disturbed vegetation that follows logging or farming is very attractive to elephants (Barnes et al. 1991; Dudley et al. 1992).

In the forests of West and central Africa farmers clear a patch of land to plant their crops. After a year or two the patch is abandoned and is soon covered by weeds and other soft-stemmed leafy herbs that grow into a tangled herbaceous mixture, often with remnant cassava or other food crops (Ahn 1961). Woody shrubs soon appear and after perhaps two more years the patch becomes a thicket that gradually evolves into secondary forest as more quick-growing and light-demanding trees establish themselves. Consequently, more browse per unit area is available to elephants in this farmbrush than in the forest itself. Meanwhile the farmer has cleared new fields nearby, providing islands of succulent crops within the farmbrush. Thus the farmer has created a mosaic of herbaceous tangles, thicket and young secondary forest with patches of different ages and in varying stages of development, interspersed with small fields of maize and cassava, and probably with scattered plantains and other crops. This vegetation mosaic is very

attractive to elephants (Nchanji 1994). In their efforts to feed themselves and their families, farmers are inadvertently managing the landscape for the benefit of elephants.

The vegetation mosaic outside the park boundary may be more attractive to elephants than the forest that has been officially set aside for them. The longer this situation prevails the more difficult it becomes to solve because people are clearing more and more land, often immediately adjacent to the park boundary, and replacing high forest with vegetation preferred by elephants. Note that we are not being judgmental in this analysis. The farmers are acting in what they perceive to be their best interests; it is unfortunate that this type of land use is also in the best interests of elephants. As each day passes and more land is modified by farmers, we move further and further away from a solution to the crop-raiding problem.

Viewed in these terms, it appears crop raiding is not perverse behaviour by elephants but rather an inevitable consequence of their isolation in a human-dominated landscape. Crop raiding by elephants is what optimal foraging theory would predict under these circumstances. It becomes clear that the aspirin approach—shooting in the air or banging drums and similar behaviour—will not work because elephants are attracted to the mosaic outside. Gunshots and drums may deter them for awhile but they eventually become habituated to loud noises. Addressing the causes of the problem by managing the landscape to make it less attractive is more likely to reduce the frequency of crop raiding. If elephants are to remain in forest fragments then wildlife managers will have to work with land-use planners, agricultural extension officers, district assemblies and farmers' associations to create a landscape that reduces the probability of attracting elephants. However, it is unlikely that one will reduce that probability to zero and there will always be the need for some aspirin.

The pressure for short-term solutions

Tackling the roots of the problem requires a delay. Wildlife managers need to examine the area and familiarize themselves with the setting. Then they need to examine the local communities and their farming

practices. They need to understand the park as a component of the regional landscape. To the farmer who wants action now, all this looks like prevarication and procrastination. Eventually farmers may refuse to cooperate with the managers, who will feel frustrated by the very people they are trying to help. The pressure will be on wildlife managers to find a short-term answer and they will be discouraged from seeking a long-term one. In some cases, intensive aspirin therapy may give managers the time they need to seek the long-term answer.

Discussion

Many parks have seen an increase in crop raiding over the last two decades. Farmers complain to the warden that the increase is due to burgeoning elephant numbers. Sometimes such increases reflect a change in elephant behaviour, for example, protection in the decade since Kakum became a national park has emboldened elephants. Formerly only males raided and then only at night, according to farmers and Dudley et al. (1992), but these days family groups raid, occasionally even during daytime. We have little evidence for or against an increase in elephant numbers in West African forest parks where crop raiding is a problem. On the other hand, the human population outside such parks has increased dramatically. The mean rate of increase for Ghana is 2.8% per annum (United Nations 2000), which means that the population doubles every 25 years. In addition, farmers have moved from the drier parts of the country to the forest zone, primarily to grow cocoa, and my guess is that the human density around Kakum is growing at about 5% per annum—that is, doubling every 15 years. The rate of a chemical reaction, r , is proportional to the concentration of the reactants A and B:

$$r = k \cdot [A] \cdot [B]$$

where k is a constant. If the rate of crop raiding is proportional to the density of elephants and the density of people (or density of fields), then the increase in crop raiding is probably due to the growth of the human population around the park and its effect upon the landscape.

This analogy may help us understand why crop-raiding problems often seem to suddenly get out of

control. If the human population is growing at say 5% per annum, then after 10 years the rate of raiding will have increased to 1.6 times its former level. But if both elephant and human populations are growing at 5%, then after 10 years the rate will be 2.7 times its former level. The lesson is that non-linear relationships (exponential growth of human and elephant populations) mean that if one does not act early, elephant management headaches can quickly become unmanageable (Barnes 1983).

We may think crop raiding is a headache today for wildlife managers in the Upper Guinea forest zone, but it is likely to become a migraine tomorrow. As agriculture expands and landscapes are modified further around protected areas we must expect an increase in crop raiding around those sites where it is mild today, and the occurrence of crop raiding at those sites that today are still free of it. We must look ahead and address the root causes of the problem around the sites where it is not yet an issue.

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