

LETTERS TO THE EDITOR

Comments on: Why do Elephants Destroy Woodland?
H. Jachmann and R.H.V. Bell in: *AERSG Newsletter*, No. 3 (June 1984: 9-10)

Jachmann and Bell's article on elephant-woodland interactions may stimulate discussion of this central issue of elephant management, but as a contribution to elephant biology and ecosystem dynamics, it only perpetuates a common but unrealistic viewpoint.

The authors use the term "feeding strategy" to mean husbandry of their food resources by populations of elephants; "adaptive" if populations use trees wisely for long-term survival, "maladaptive" if they appear to be destructive. However, it is at the level of individual nutrition and survival where much of natural selection acts, and individual elephants directly benefit from felling trees. Elephants are primarily grazers when circumstances allow, but in savanna dry seasons or droughts, elephants must feed on woody plants to stay alive. The amount of herbivory which trees can tolerate and the rate at which they grow and reproduce will depend on local soil and rainfall conditions. At the same time, individual elephants cannot alter their immediate metabolic and survival requirements to track changing growth rates of woody plant populations, particularly where plant productivity is seasonally low or highly variable. Elephant populations may be in (fortuitous? short-term?) equilibrium with woodlands where local conditions favour that outcome of the interaction between trophic levels. However, elephant and tree population dynamics may show cyclic or irregular fluctuations in many other ecosystems across the diversity of habitats in the African continent and have probably done so for millennia.

The authors' hypothesis that the present-day savanna elephants are a "maladapted minority" receives little support from their evidence. There are a number of problems with their argument, but unfortunately there is limited space to discuss them here. Their most contentious suggestion is that long-term, stable elephant-woodland equilibria should be the general rule in elephant evolution and ecology. This view has more likely arisen from the philosophical bias of the authors against dynamic change in ecosystem structure than from objective study of plant-herbivore interactions. Should we really be trying to show why "maladapted" elephants "destroy" woodlands? Or should researchers and managers attempt to understand and predict the kind of changes which occur in complex African ecosystems under the influence of natural events and man-made disturbances?

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While the destructive feeding of bush elephants in relation to browse may indeed sometimes *appear* to be maladaptive, it is unlikely that this is because they are recent emigrés from the forest. On the contrary, most students of elephant evolution agree that the trends of increasing development of trunk, teeth, and body size culminating in the mammoth and the surviving elephant species, all are linked to increasing adaptation to grass feeding, and this *includes* the forest elephants.

All modern elephants, including savanna elephants, browse to a greater or lesser extent. There are at least two very good reasons for this that should not be overlooked in debates on elephant-woodland interactions. Firstly, there are places and times (e.g. during droughts) when elephants would simply die

if they were unable to browse as well as (on instead of) graze. Browsing has an obvious and very basic survival value to an animal that requires such prodigious amounts of herbage, especially in semi-arid habitats.

Secondly, mammals with a grass-dominated diet are faced with problems of obtaining a sufficiently wide variety of amino acids (and other nutrients) to sustain bodily functions and processes. This is particularly true of animals like the elephant that possess a hind-gut, or caecal fermentation chamber situated posterior to the small intestine. There is good evidence to support this hypothesis but a lack of space to discuss it here.

It is probably for these sorts of reasons that elephants, both African and Asian, attain their highest ecological densities in habitats with a mosaic of forest and grassland. Elephants — including so-called forest elephants — are not actually forest animals, being no better adapted to dense forests than they are to open savannas. This is not only because such forests contain little grass, but probably also because the vast majority of the browse available in primary forests is unsuitable for dietary optimization purposes. Elephants are in fact a classic forest-edge, ecotone species, and it is very important to bear this in mind when considering the adaptiveness or otherwise of destructive browsing across the range of habitats in which elephants are found.

My interpretation is that the elephants causing the classic management problems as to modification of the habitat are not so much a maladapted minority, as the unfortunate ones that have got caught in areas where long-term stable elephant-woodland equilibria are not and probably never were, possible.

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Elephant in Zimbabwe [R. Martin]

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Contributors are described at the foot of their articles only if non-members of AERSG.

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We will welcome articles, no longer than 1,500 words, for *Newsletter No. 5*. We will publish suitable black-and-white photographs and graphics and may edit some articles. The deadline is 6 May 1985.

Lucy Vigne
Editor