The Cost of Conserving Elephants

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ABSTRACT

African elephants attract a variety of economic values, whether actual or potential. Furthermore elephants, to varying degrees in different range states, live both within and outside protected areas. 1n both situations, elephants are usually in conflict with man. Consequently range states have to expend funds if elephants are to be protected throughout their range. As a general rule, it was necessary to spend around US\$200 per km^2 of protected area in 1981 to prevent the decline of elephants from severe commercial poaching for their ivory. Following the ban on international trade in ivory in 1989, it is imperative that costs of conserving elephants in and out of protected areas in different range states are quantified. Given that ensuring the success of law enforcement efforts is probably the most important management objective for the future conservation of elephants, and given the amount of less relevant research undertaken on elephants, greater emphasis needs to be placed upon collecting and analysing data on this topic.

INTRODUCTION

African elephants attract the interest of a wide variety of people, ranging from local farmers, meat hunters, commercial ivory poachers and safari hunters to tour operators and tourists, scientists and conservationists. Depending on one's perspective, elephants attract a variety of economic values, whether actual or potential, and can in part recover their costs through earnings from tourism, hunting, culling and so on (Barbier et *al.* 1990). Furthermore, elephants, to varying degrees in different range states, live both within and outside officially gazetted protected areas. 1n both situations and especially in the latter, elephants tend to be in conflict with their human neighbours. Since the passage of game laws, elephants have been seen by local people as a valuable source of income or meat from which they have been disenfranchised. With low incomes and the spiralling price of ivory of world markets prior to 1989, the incentive to hunt elephants was high throughout much

of Africa (Milner-Gulland & Leader-Williams, 1992). Since the ivory ban in 1989, the available evidence generally suggests that commercial poaching for ivory has declined (Dublin & Jachmann, 1992), at least temporarily. It remains to be seen whether predictions that alternative markets will develop are to be fulfilled (Barbier et *al.* 1990). Outside protected areas, elephants are often in direct conflict with man for his land and crops, and considerable numbers of elephants are still shot annually throughout Africa as cheap sources of meat to compensate for real or fabricated crop damage.

Given the above, it has been appreciated that funds and resources need to be expended upon maintaining the integrity of protected areas in Africa, including the elephant component (Bell & Clarke, 1986; Leader-Williams & Albon, 1988; Parker & Graham, 1989). Outside protected areas, investments in elephants are also necessary to promote schemes that secure jobs locally and that give ownership and use rights to local people, such that some proceeds from safari hunting and tourism are returned to local people (Martin, 1986; Lewis et *al.* 1990). This short review examines the few available data that quantify costs of maintaining elephants and makes suggestions for placing research on this topic high on the agenda of the African Elephant Specialist Group (AESG).

COSTS OF PROTECTING ELEPHANTS FROM COMMERCIAL POACHERS

The former African Elephant and Rhino Specialist Group (AERSG) placed considerable emphasis during 1981 and 1987 upon collecting data from range states on the resources and budgets they devoted to their protected areas (Cumming et al. 1984, 1990). These data were obtained from questionnaire replies that attracted a disappointingly low response rate (see Table 1). It should be noted here that the data collected in these surveys represent the total manpower and budgets used by conservation agencies for a variety

of activities (including road maintenance, routine monitoring, sanctioned culls, law enforcement patrols, burning and fire control, and so on). Therefore, these figures do not represent resources that can be attributed specifically to conserving elephants, but are those used by conservation agencies attempting to maintain the integrity of their protected areas, of which elephants are such an important component. Following the collection of the first survey data by AERSG in 1981, it was suggested that shortage of manpower and of financial resources on the part of national conservation agencies was a major constraint to the successful conservation of the African elephant (Cumming et al. 1984). Rules-of-thumb had suggested that around one man per 20 km^2 of protected area or the spending of around US$200 per km^2 was necessary to achieve successful conservation of valuable species like gorillas, rhinos and elephants (Bell & Clarke, 1986).

A detailed study of law enforcement undertaken in Luangwa Valley, Zambia, from 1979-1985 confirmed that levels of manpower and resources of this order were indeed necessary to protect elephants from heavy commercial poaching (Leader-Williams & Albon, 1988; Leader-Williams, 1990; Leader-Williams et al. 1990). Findings from Luangwa Valley were extrapolated to other African range states, using data on numbers of elephants during 1981-87, together with estimates of budgets and manpower in national conservation agencies in 1981 extracted from surveys undertaken by or on behalf of AERSG (Cumming et al. 1984, 1990; Bell & Clarke, 1986; Douglas-Hamilton, 1987). These continent-wide surveys of elephant numbers are prone to considerable methodological problems, but given the plight of the African elephant, I took the approach that it was preferable to learn from the best available estimates than to argue about data quality. There was a wide variation in the budgets allocated by central governments to national conservation agencies in 1980 and in their staffing levels, both absolutely and in relative terms when compared to the total areas under protection. Using data from 14 countries from which there were both a measure of change in elephant numbers and of budgets, it was apparent there was a direct relationship between estimated declines of total numbers of elephants and spending, corrected for total area (Figure 1). To have achieved a zero decline of elephants, the relationship predicted that 1981 spending levels should have been US$215 per km^2 (Leader-Williams & Albon, 1988; Leader-Williams, 1990).

Table 1. The rite of response to AERSG questionnaires on the resources available to national conservation agencies In 1981 and 1987 (from Cumming et al. 1984, 1990).

	1981	**1987**
No. Questionnaires	29	47
No. Replied	15	14
No. Fully covered by both questionnaires	3*	
No. Half covered	2	

Additional data was provided for Malawi 1n 1981 by Bell and Clarke (1386), which is included 1n Table 2.

The relationship between spending and success in protecting elephants was significant but only explained 32% of the variance. Clearly many other factors could have been involved here, and throwing conservation funds at a problem was no guarantee of success. Staff of the wildlife authorities need motivation such that they themselves do not become involved in killing elephants and that they spend an effective amount of time on patrol. Patrols must be balanced between field patrols that ensure elephants receive sufficient protection and the more cost-effective investigative patrols which ensure that offenders are caught. The degree of challenge faced by elephants in different situations also varies due to such factors as the size and density of elephant populations (and their attractiveness to commercial poaching operations), the degree of political stability and availability of weapons in particular range states, the severity of penalties in range states and the likelihood of apprehending those entrepreneurs or senior politicians involved in organising the poaching, and so on (Bell & Clarke, 1986; Douglas-Hamilton, 1987; Parker & Graham 1989; Leader-Williams et al. 1990; Dublin & Jachmann, 1992).

One of the many major flaws with the data in Figure 1 was that it was not possible to separate out the costs and successes of protecting elephants in and out of protected areas. There are many reasons for this, not least the institutional differences between range stages in jurisdiction of the wildlife authorities and what actually comprises a protected area in different countries, and the difficulty of stopping elephant censures at protected area boarders.
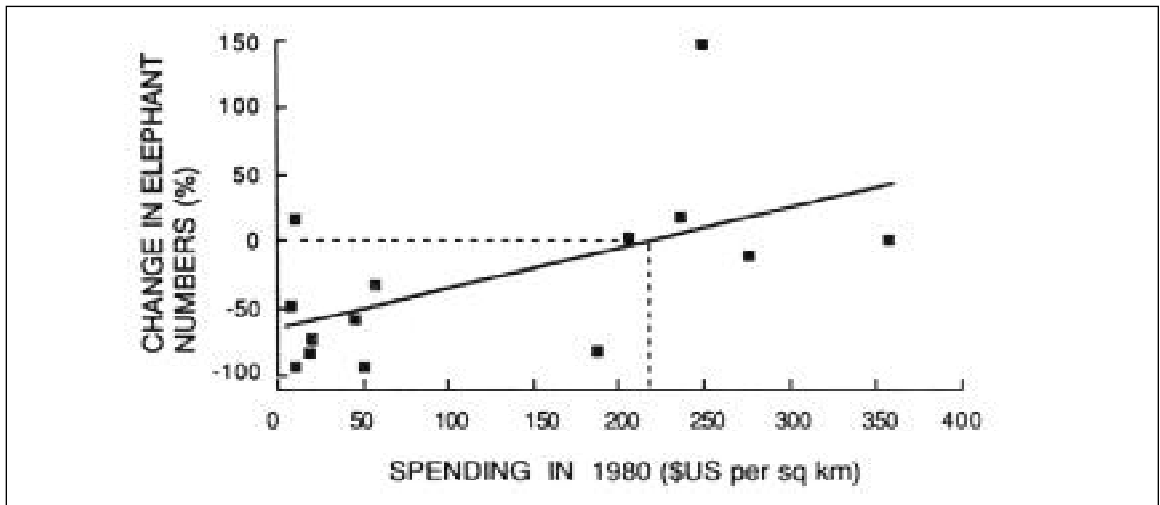
Making the distinction between costs of protecting elephants in different categories of land is clearly one of great importance, as evidenced, for example, by Botswana which was one of the outliers in Figure 1. Botswana's wildlife authority spent very little per km^2 of protected area yet the country's elephants, living largely outside protected areas, appeared to have increased significantly (assuming the censuses were correct). One study, also from Luangwa Valley, documents the costs of protecting elephants living amongst humans outside protected areas (Lewis et *al.* 1990). The employment of village scouts and the initiation of a range of activities during 1985-87 that provided revenue to villagers from wildlife cost US$22 per kin^2, and resulted in reduction of poaching of elephants, as evidenced by carcass finds. This study demonstrates the potential of reducing the costs of conservation if conflicts can be resolved outside protected areas, but future studies of this kind should be accompanied by more appropriate indices of the success of conserving elephants than carcass finds that are not corrected for population size.

CHANGING CIRCUMSTANCES

The figure of US$215 gives some idea of the sum it was necessary to spend to prevent the decline of elephants in protected areas during a period of intense commercial ivory poaching during the early and mid 1980s. Several events have occurred since that time. On the one hand, with inflation the 1981 sum of US$215 is now equivalent to US$340. On the other hand, the African elephant was moved to Appendix I of CITES in 1989, and the demand for ivory appears to have plummeted in Europe, America and to have fallen by 50% in Japan. This might have been expected to reduce the incentive of commercial poachers to kill elephants for their ivory within protected areas throughout their range. However, evidence from certain southern states suggests that there is still sufficient incentive to poach elephants (Dublin & Jachmann, 1992).

When it was time to ask the question "has the ban worked?" to provide delegates to the 1992 CITES Conference with scientific evidence to enable them to make an informed decision on whether to vote for continuation of the ban, it was like drawing teeth to provide that evidence. Visits to six range states revealed a paucity of relevant data and, despite all the research that has been conducted on elephants to date, the information needed to develop proper management and conservation strategies is simply not collected in the vast majority of key conservation areas (Dublin & Jachmann, 1992). This remains a sad indictment upon the scientific community and national wildlife authorities, for exhortations to carry out research that is relevant to management have been made for many years (MacNab, 1983; Bell, 1986). Indeed when such research is carried out, it has proved to be of considerable interest to academics (Leader-Williams & Albon, 1988; Leader-Williams *et al.* 1990) as well as hopefully being of some practical importance.

From my perspective, I would hope for improvements in the way such questions are approached at two levels, namely the micro-level, comprising individual

populations within range states, and the macro-level, comprising data across range states. At the micro-level, Luangwa Valley in Zambia remains the only conservation area in Africa where a concerted effort has been made over the course of more than a decade to collect in-depth data on law enforcement input and poaching levels (Leader-Williams *et al.* 1990; Bell et *al.* in preparation). I believe it is vital that such data are collected in other areas that encompass elephant populations both within and without protected areas and at different levels of challenge and conflict, and as far as possible in a standardised manner that facilitates comparisons between areas both at national and international levels.

At the macro-level it is important that efforts of the AESG focus on ensuring further co-operation between range stages in pooling and sharing their data. The African Elephant Database contains a considerable quantity of information on censuses and population sizes. Yet, when attempting to compile an updated figure similar to Figure 1 for inclusion in this paper, I found there were insufficient data on budgets available

to different range states in 1987 that could be matched against reliable changes in population size between 1987 and 1991 even to construct a graph. I hope, therefore, that my earlier comments on the disappointing response of range states to requests for such information (Table 1) will be viewed more positively. An updated graph would have provided an opportunity to examine whether, over the period embracing the ivory ban, it appeared that the challenge to Africa's elephants had lessened in terms of resources necessary for successful conservation. Such data are vital to the future of the African elephants and necessary for AESG to have at hand in order to shore up the scientific basis of important policy decisions.

1n making this point, it must be remembered that conservation efforts in Africa are taking place against a background of declining government budgets to wildlife authorities (Table 2). Whether considered as actual budgets or when corrected for inflation, or as manpower, the budgets and resources of five countries which answered both 1981 and 1987 questionnaires

Table 2. The declining budgets available to national conservation agencies (from Cumming et al. 1984, 1990; Bell & Clarke, 1986). The budgetary data for 1981 is shown both in actual terms (shown as 1981) and in real terms, corrected for inflation with a base of 1987 (shown as 1981').

Country	Year	Area protected (sq km)	Total budget (US$x1000)	Budget / area ($/sq km)	Field force (N men)	Area / man
Central African Republic	1981	57,000	460	8.0	167	341
	1981*		576*	10.1*		
	1987	270,000	1,267	4.7	400	675
Mozambique	1981	32,500	600	18.6	305	105
	1981*		751*	23.1*		
	1987	65,700	448	6.8	58	1133
Zimbabwe	1981	47,000	13,000	276.6	1894	24
	1981*		16,270*	346.2*		
	1987	47,000	9,117	194.0	1380	34
Malawi	1981	11,000	500	45.0	240	46
	1981*		626*	56.9*		
	1987	10,800	526	48.7	191	56

have declined in real terms. This shortfall may in part be provided by increased external donor assistance to range states. For example, elephant action plans for 33 range states requested assistance of the order of US$360 million through the African Elephant Co-ordinating Group in 1991, and perhaps one-tenth of this sum may have been forthcoming after one year. Given such funding shortfalls, it can only be stressed again that it is incumbent upon AESG and its members to ensure that appropriate data to answer such fundamental questions as "how much funding is required to conserve elephants?" and "has the ivory ban worked?" are collected and co-ordinated. By and large I believe we have failed to date and so let us work quickly to ensure that this state of affairs does not continue for much longer.

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