AFRICAN ELEPHANT & RHINO GROUP NEWSLETTER

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FOR CONSERVATION
OF NATURE AND NATURAL RESOURCES
SPECIES SURVIVAL COMMISSION

ARC
Animal Research and Conservation Center

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THE CONSERVATION DIVISION OF THE NEW YORK ZOOLOGICAL SOCIETY)

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COVER:*Part of a collection of 88 black rhino skulls, about 60 of which have come from poached animals, in South Luangwa National Park, Zambia/n 1983.* [Esmond Bradley Martin]

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Report on Activities

The third meeting of the AERSG, held in Nairobi on. 3-4 December 1983, was attended by David Western, Esmond Bradley Martin, David Cumming, Iain Douglas-Hamilton, Ian Grimwood, Hanne Lindemann, Rob Malpas, Cynthia Moss and Lucy Vigne.

Robert Scott, Executive Officer, SSC, came to the meeting from Geneva. Others present were Keith Lindsay and Phyllis Lee who are engaged in elephant research in Amboseli National Park, Kenya.

Matters requiring attention in the next six months were discussed and most of these are now under way. They are either described in the body of this *Newsletter* or outlined below.

1. Charles Mackie, Senior Management Adviser, and Fraser Smith, Technical Specialist, arrived in Garamba National Park, Zaire, to start the Rehabilitation Project of the Park. Kes Hillman went to Garamba simultaneously in order to monitor the few remaining northern white rhinos. A decision should be forthcoming in the next few months as to what should be done with the rhinos. Work has started, however, and is described on page 19.
2. Elephant and rhino survey data were discussed, and updated questionnaires are still being returned, Iain Douglas-Hamilton has an assistant, Ken Kaliski, to help analyse the heavy backlog of the elephant data. The IUCN Wildlife Trade Monitoring Unit, Cambridge has agreed to publish the African Rhino Action Plan once it is fully updated.
3. Five black rhinos were successfully translocated from Natal to Texas in March 1984. The project is a co-operative effort of Game Conservation International, the American Association of Zoological Parks and Aquariums, African Fund for Endangered Wildlife and the Natal Parks Board. The rhinos will be encouraged to breed in the wide open spaces of two Texas ranches. It is hoped that eventually the offspring will be reintroduced into the wild in Africa once the poaching problem has been contained. Judging from reports, all animals are doing well. The outcome of the project will be reported in the December *Newsletter*.
4. Save the Rhino Trust, Zambia, has been given substantial funds by the Norwegian Agency for International Development (NORAD). This will cover anti-poaching activities for die next two years at least. During this period every effort will be made to establish a more permanent means of generating funds to ensure the future financial independence of the Trust.
5. A study of the forest elephant is to be carried out by Richard Barnes in Gabon. He will try to develop a methodology for counting elephants in the tropical rain forest which will be adapted to other countries in Central Africa.
6. The present CITES requirement that every piece of worked ivory must have documentation was discussed. The Group felt that the resulting huge amount of paper work was counterproductive to the conservation of elephants. The Group therefore agreed that pieces of worked ivory weighing under 1kg each should be exempt of all CITES documentation. However, all worked ivory consignments in excess of 10kg would require CITES documentation.
7. At the CITES Technical Committee meeting on ivory to be held in Brussels at the end of June 1984, all aspects of the trade will be discussed. David Western will be attending.
8. David Western, supported by Kenton Miller, Director General of IUCN, has approached several international ivory trading associations about the possibility of setting up an Ivory Council whereby conservationists, traders and other interested parties will co-operate to exchange information, set priorities and monitor the trade, with the object of conserving the African elephant. Prospective members of the Ivory Council will be meeting in Brussels at the time of the CITES Technical Committee meeting on ivory.
9. The Tokyo Ivory Arts and Crafts Association has donated $10,000 to AERSG for the purpose of ascertaining the amount of raw ivory consumed domestically in southern Africa, and to study the ivory carving industries of this region. Esmond Bradley Martin has completed the field work in Zimbabwe, Botswana and Malawi. The first of his reports is on pages 5-6. Further reports will be published shortly.
10. Over the past three months the group has widely disseminated information concerning the illegal importation of rhino horn into North Yemen through various newspapers and magazines, such as the *Sunday Times, Observer, The Times* of London and *BBC Wildlife,* for the purpose of encouraging the countries involved to stop the trade. The North Yemen problem is described on page 18.

The fourth AERSG meeting will be held in Gaborone, **Botswana** on 22-23 September 1984**. Lucy Vigne**

Black rhino [Anthony Hall-Martin]

The objective of the AERSG *Newsletter* is to offer to members of the group and those who share its concerns brief factual articles containing points of information and topical interest relevant to elephant and rhino conservation.

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

Readers are reminded that material published in the *Newsletter* does not necessarily reflect the views of AERSG.

We will welcome articles, no longer than 1500 words, for *Newsletter* No. 4. We will publish suitable black-and-white photographs and graphics and may edit some articles. The deadline is 19 November 1984.

Lucy Vigne
Editor

Humpty Dumpty and The Rhinos

There are some 13,000 black rhinos left in the wild. That is our best guess and it could be a few thousand out either way. Too many populations are remote and too many under impenetrable cover to give us a better fix. 13,000 doesn't sound beyond hope; many safe species number far fewer. But of course, the criteria of endangerment do not rest on numbers alone, hut on trends and threats, actual or perceived. In other words, on vulnerability. By this reasoning, the black rhino is endangered, far more than the figures avow. Most survive in small isolated populations of fewer than 50 individuals spread over most of Sub-Saharan Africa, and even the few populations exceeding 1,000 are dwindling and fragmenting fast.

Geneticists claim that populations fewer than 50 in number will suffer inbreeding depression'- a loss of genetic hetero-geneity and, consequently, lower natality and higher mortality. Whether inbreeding becomes acute depends on several factors, among them: sex ratio, male breeding differential, and the frequency and randomness of rhino contacts. Eventually, small isolated populations will lose genetic adaptability and become vulnerable to extinction by competition, disease, or other agencies. So what is the geneticist's solution?

Conserve big populations. That is biological logic.

Here reality objects: big populations are most vulnerable to poaching. It is the Tsavo story. Tsavo once had the most rhinos in Africa, more than 8,500 in the late 1960s. Ten years later, fewer than 150 remained, most of them widely scattered and seldom in contact. The same has happened to all other big populations save Luangwa Valley which, though protected by the most expensive black rhino conservation programme, has still lost ground dangerously, and Selous, which is mercifully remote but may not long remain so. Remoteness and cost penalize big-population conservation.

The conservation record is best on specific small populations, such as Aberdares, Nairobi National Park and Addo, areas easily and intensely patrolled. Manpower coverage tips the balance Only small populations are affordable.

We confront a dilemma then: big is best, but small is feasible. I-low can it be resolved?

Here the black rhino predicament affords a conservation challenge, for it foreshadows numerous species destined to fragment into island populations. Such species will be halfway safe, half-way managed, not quite secure or big enough to survive unaided, nor so endangered or so few that captive propagation is the only solution. The black rhino affords us a valuable chance to pose questions and solve issues confronting future fragmentary species.

We can approach the size-feasibility dilemma in two ways, by reducing the need for management intervention where possible, and when it is necessary, by improving propagation techniques and reducing their costs.

Intervention can be minimized in several ways. First, by national censuses to identify all populations, both on public and private lands. Few countries have more than a hazy notion of rhino numbers. Each population should be classified by size, demographic status, and vulnerability. Second, criteria for selecting populations most likely to survive without intervention should be drawn up. Priority should be given to animals within existing sanctuaries, to the biggest and demographically most viable populations, and to those least vulnerable and most protectable. Third, special attention should be given to rhino populations on private lands, where they are important, as in Kenya. Policies inducing landowners to conserve are essential. No landowner will make a special effort if, as a result of his conservation success, the Government unilaterally hauls away rhinos and dumps them in unsafe areas. On the other hand, the Government must protect rhinos on private lands against changes in attitude, land ownership, and safety.

Lastly, merging populations prior to localized extinctions can also prevent loss of valuable genetic heterogeneity and circumvent the need for later and continued intervention in small populations. Ones and twos scattered everywhere add up to nothing that can survive. Consolidated, such remnants can be better protected, will need little or no further intervention, and will produce viable progeny for rehabilitation, when feasible.

There are three main repositories for remnant populations -public lands (usually national parks or reserves), private lands, and zoos. One can imagine a situation where, like the northern white rhino, a marginal population survives in zoos and national parks. In this case it would be expedient to consider both part of an international herd and to manage them accordingly. A three-way interchange of wild, private-property and zoo animals may be necessary, expedient, or simply cheaper. By widening the scope to all categories, we may be able to minimize later management, and greatly reduce the public conservation costs.

If management is necessary, we need to be sure it is precise and cheap. Many rhinos have been moved from vulnerable **to** safe areas, and from excess herds both to marginal populations and to establish new ones. Most recently five excess South African rhinos were shipped to Texas ranches to begin a breeding herd where, under the supervision of the American Association for Zoological Parks and Aquariums, they will be bred. Obviously, capture and translocation techniques must be continuously perfected, as must rehabilitation to the wild, or into new areas. We still have a long way to go in improving these methods. An operation may soon be underway to transport a few remnant Sumatran rhinos from the dense jungles of Sabah to North American zoos. The feasibility and cost, estimated at more than a million dollars, may yet prevent the project It would be a disaster to see a species go extinct for lack of know-how or affordable capture costs.

In theory, at least, inbreeding can be avoided by techniques other than risky and costly translocation. Artificial insemination is routine for domestic stock. It is cheap and risk-free. Why not with rhinos? Zoos should be technological testing grounds for endangered species management, and increasingly are so. With all those rhinos now being tranquillized and moved, it would be easy enough to electroejaculate males and retain a sperm bank. But then we need to know when the female is in estrus. Are there behavioural cues, or must we develop and rely on hormonal assays from urine samples? Again, zoos are ideal laboratories in which to develop improved and cheaper technology. It requires the conservationist to pose the problems, and the zoo researcher to study solutions.

After Humpty Dumpty fell off the wall, no one knew how to put him back together again. Species fragmentation could

end like Humpty Dumpty. It need not. Given the spectre of ever more fragmentation, we need plenty of practice to make sure we can do so routinely and cheaply. In putting the smaller rhino pieces together again, we can learn lessons for patching up other Humpty Dumpties.

David Western

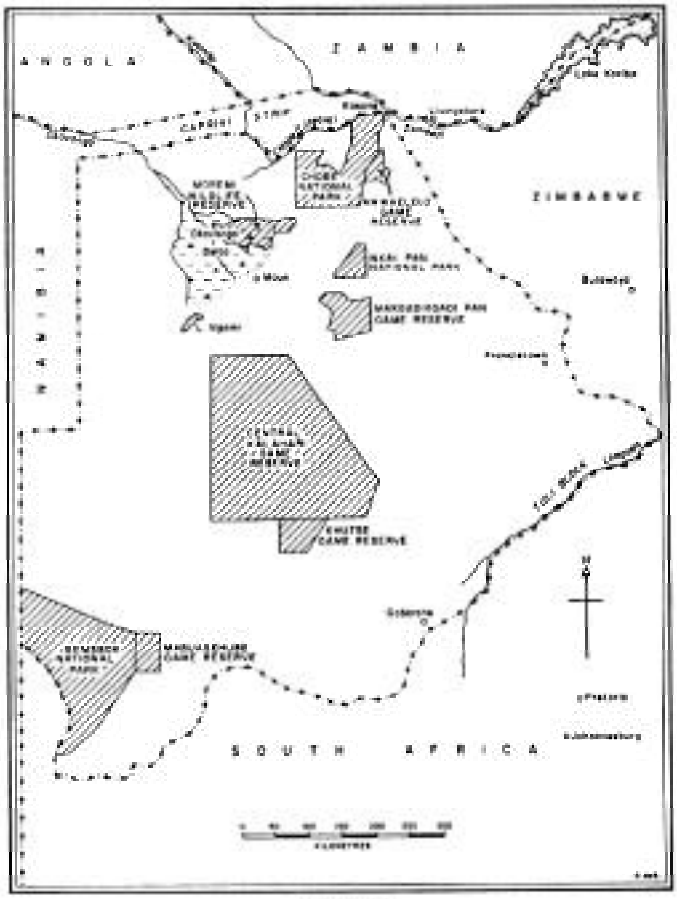
The Ivory Industry in Botswana

For a long time, most countries in southern Africa have exported considerable quantities of raw ivory to Europe and Asia, where various commodities are manufactured from it, and many items have been sent back to the source countries for sale. When international tourism to Africa became a major industry in the 1960s, beads, bangles and other ivory jewellery from India and Hong Kong could generally be found in African curio shops. More recently, the slowing of economic growth, scarce foreign exchange and vast unemployment have encouraged entrepreneurs in some of these African countries to start their own businesses to earn money from producing the types of ivory items mainly in demand by tourists.

African production of ivory commodities has met with varying success. Even in South Africa, which attracts hundreds of thousands of foreign visitors every year and where ivory pieces are among the major products sold in curio shops, locally manufactured ivory jewellery could not compete with that from Hong Kong were it not for the transport costs and 25% duty imposed on the latter. On the other hand, some of the locally carved statues of wildlife in South Africa are masterpieces and recognized as such by ivory collectors all around the world. In Zimbabwe, where the annual retail value of locally made ivory commodities is approximately $8 million, it is the residents and citizens of the country who buy most of the ivory items made there, to take with them to sell for hard currency when they go abroad.

While Botswana has not been a major source for raw ivory on international markets, it has attracted European sport hunters since the nineteenth century, and trophy ivory continued to be exported from the country until very recently. Botswana's ivory manufacturing industry started in 1975, one year before South Africa's and two years after Zimbabwe's. The company which began commercial ivory manufacturing, Botswana Game Industries (B G I), hired an English jeweller to teach some local Africans how to make ivory beads, bangles and lighters at its headquarters in Francistown, northern Botswana close to the major elephant populations. The company expanded its workforce to 20 ivory craftsmen and in 1976 began producing carved tusks and small sculptures of elephants and buffaloes. However, the carvers had no previous experience their workmanship was inferior and it did not look as if the enterprise would be profitable. In 1977 B G I stopped producing carvings, and in 1979 closed down the part of the factory that manufactured ivory beads, bangles and lighters.

There were relatively few foreign tourists visiting Botswana, and B G I was not competitive on international markets with the production from Hong Kong, which was considerably cheaper because the Chinese are better skilled, waste less ivory and work longer hours. Despite being exempt from the 20% to 25% import duty in South Africa (because Botswana is a member of the Customs Union), B G I 's worked ivory could not make significant inroads even there.



B G I had consumed between two and three tonnes of ivory a year from 1975 to 1979, which it had bought from local licensed hunters, licenscd traders and from the Botswana government. One of the directors used some of the ivory waste to fertilize the roses in his garden; he could find no other use for it.

A second ivory carving factory started up in Francistown in 1975, but was put up for sale in 1977. losef Generalis, a Greek, bought it. Called Ivory Products, this company now has 25 ivory craftsmen, although only eight are carvers. Some are former B G I employees, and the others are labourers from the area around Francistown, mostly Kalanga men. Using electric drills, lathes and other tools, they make jewellery (mainly bangles), candlesticks, lamps, lighters, salt and pepper shakers, napkin rings and smoking pipes. The carvers produce designs on whole tusks and sculpt African tribal head statues and small elephants. They work a 45-hour week and are paid for each piece they make, averaging $138 a week. One highly skilled Zimbabwean carver working for Ivory Products earned on average $300 a week in 1983. Approximately 40% of the finished ivory pieces are exported to South Africa; most of the rest go to Germany and the United States;

only about 15% are sold within Botswana, in Francistown, Gaborone (the capital city) and Maun. Mr Generalis obtains his raw ivory mainly from the Department of Wildlife, National Parks and Tourism which put up for sale by tender 2.2 tonnes of ivory in 1983, confiscated from poachers, found in the field and acquired from control work. Mr Generalis bought all of it, which had an average tusk weight of eight kilos, for $42 a kilo, which was just about the world market price. From 1977 to 1981 Ivory Products consumed an annual average of 1.3 tonnes, but in 1982 this figure increased to 2.5 tonnes. Mr Generalis ivory business has become the largest and most successful in Botswana.

Another ivory manufacturing firm in Francistown, Bushman Products, consumed between 1979 and 1982 an average of 400 kilos of ivory every year for making jewellery. In the capital city there is just one ivory carver (an expatriate), and there is a former resident of Zimbabwe now in Maun who makes belt buckles, bangles and a few other accessories.

Botswana has more than enough elephants to support the local ivory manufacturing industry. There arc a minimum of 20,000 elephants, and perhaps a lot more. If the elephant population is increasing at the same rate as neighbouring Zimbabwe's, which is five per cent per annum, then 1,000 animals could be removed each year. These would produce 15 tonnes of ivory, well in excess of the three tonnes of raw ivory required by the ivory manufacturers.

However, according to officers of the Department of Wildlife, National Parks and Tourism, over the past few years there has been a significant increase in elephant poaching, and it is not known whether or not this has caused a decline in their total numbers. The illegal killing of elephants has been most severe in the extreme northern part of Botswana; poachers from Namibia have crossed the eastern Caprivi Strip and shot elephants along the Chobe River; furthermore, the elephants have also been disturbed by licensed hunters. As in Kenya's Tsavo area in the 1960s when elephants moved inside the boundaries of the parks for protection, so have many elephants in Botswana retreated into sanctuaries. Both Chobe National Park and Moremi Wildlife Reserve have attracted great numbers of elephants from surrounding areas, with the result that the vegetation in both these places has suffered severely. The Department of Wildlife, National Parks and Tourism is very concerned about the effects of elephant predation, and particularly about the loss of many trees in Chobe and Moremi. It requested a scientific study to be carried out on the elephants and the vegetation of northern Botswana, in view of the need to develop a proper management plan for the region. Fortunately, a research project commenced in 1983 to make an estimate of the northern populations and to attempt to answer the questions posed by the Department, regarding habitat. destruction by elephants. It is sponsored by the Endangered Wildlife Trust and the University of the Witwatersrand, but it will take many months to complete and will cover only part of the range of Botswana's elephants.

In the meantime, all elephant hunting in Botswana has been stopped. In 1976 606 elephant hunting licences were granted: 194 to citizens, 207 to residents of the country and 205 to non-residents. The total numbers then decreased to 567 in 1979, 448 in 1980, 392 in 1981 and 104 in 1982 (68 to citizens, 6 to residents and 30 to non-residents in that year). Some hunters who had a licence to kill one elephant exploited the system. In Botswana, any elephant tusk weighing less than 10 kilos is considered to be from an immature animal and consequently illegal. All such tusks are confiscated by the Department. Some hunters who shot an elephant with small tusks would either just leave them in the bush or sell them illicitly and hunt another animal to take its place on the licence.

Towards the end of the legal hunting period, a lot of the Department's time was taken up in allocating the elephant licences. Simply put, many, many more people wanted to shoot an elephant than there were licences available. A great deal of money could be made from selling various parts of the animal. In 1982 the minimum-sized pair of legal tusks brought about $900; the hide from an average bull elephant (180 kilos) was worth $420, the four feet (for making baskets) $93, the ears $18 for the pair, the trunk $28 and the tail $9. Thus, BG I in 1982 paid a hunter at least $1,468 for 20 kilos of ivory and the other commercial parts of an elephant, excluding its meat The licence fee at that time was only 100 pula (about $93) for a citizen, 300 pula for a resident and 600 pula for a nonresident.

In 1980 when David Peacock (now Senior Game Warden) was in Kasane, 100 elephant licences were allocated for his area but there were over 10,000 applicants for them! A draw system was introduced, but to alleviate the massive paper work involved in granting the licences, the Department should have increased their price very substantially, which in turn would have also increased the Botswana government's share in the profits of the hunts. The elephants are a national asset, and the few lucky hunters should not have been allowed to reap so high a percentage of the financial rewards.

It is imperative for the Department of Wildlife, National Parks and Tourism to tighten up its law enforcement to reduce poaching and to bring a halt to the illegal movement of ivory. It should also probably try to implement some of the controls on the ivory manufacturing businesses that have worked so successfully in Zimbabwe, such as the registration of all ivory carvers and the ivory they use.

So that ivory manufacturers are not tempted to purchase illicit tusks during the elephant hunting ban, the Department should continue to sell all the raw ivory it collects. Compared with the Zimbabwe ivory industry which consumed about 15 tonnes of ivory in 1982, or the South African one which used six tonnes, Botswana's industry is quite small and requires only three tonnes a year. Yet, the ivory pieces are primarily exported, and the Botswana government makes $1.32 (1.43 pula) from an export tax levied on every kilo of worked ivory.

The country has a much larger elephant population than South Africa, and its prospects for an increase in tourism are very good. There is, indeed, considerable potential for expansion in the Botswana ivory industry, and there are valid reasons why the Department should encourage it as a rational use of a renewable resource. It is. understandable that the governments of southern Africa want to benefit from having ivory manufacturing and carving businesses in their own countries; but in Botswana there are some very serious drawbacks due to unskilled carvers who waste a lot of raw ivory and make poor quality items. This could be rectified by bringing in a few master craftsmen from Zimbabwe to teach them better methods of cutting up a tusk and better techniques in carving and finishing their pieces. Botswana presently has only about 30 ivory craftsmen; given supervision and help from specialists, they could improve the quality of their carved African animals (one of the most popular of ivory items on

the market) and they could experiment with making different ivory commodities such as good jewellery with African pastoralist designs. Skill and ingenuity are necessary if the industry even intends to gain a larger share of Botswana's own ivory market, over half of which is now supplied by imports from South Africa and Hong Kong.

[The author would like to thank the Tokyo Ivory Arts and Crafts Association, the World Wildlife Fund and IUCN for supporting this project Several people in Botswana, especially Peter Becker and losef Generalis, were most generous with their time and information. A note of appreciation is also due to the Department of Wildlife, National Parks and Tourism in Botswana, whose officers helped to supply important data.]

Esmond Bradley Martin

Law Enforcement in Malawi Conservation

A MONITORING SYSTEM

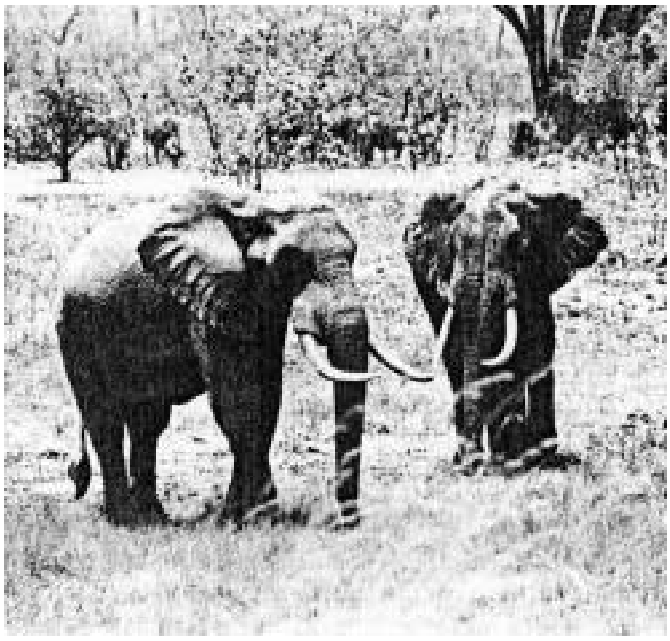
The use of wildlife resources, plant and animal, has been basic to human ecology since the origin of man. Conservation legislation has created a new class of illegal activity, broadly known as poaching, and has swept progressively more forms of wildlife use into it, until in some areas, most are illegal. This situation has created a conflict of interests and value systems between the conservation establishment and the general public. As a result, a high proportion of all conservation effort in terms of staff and expenditure is devoted to law enforcement.

Because of the importance of illegal activity and law enforcement in African conservation areas, the Wildlife Research Unit of the Malawi Department of National Parks and Wildlife has been attempting over the last 7 years to develop a system for monitoring the quantity of illegal activity and of law enforcement effort by area and by time period. This allows us first to assess the ecological and economic significance of illegal activity in a particular area; second, to allocate-priority to funding and effort for law enforcement programmes; and thirdly to assess the effectiveness of different types and intensities of law enforcement effort.

The method is simple and involves little more than common sense. It is based on the systematic use of patrol reports produced by field staff. The system is intended firstly to quantify patrolling effort by various measures; secondly to quantify illegal activity encountered by patrols according to a set of standardized categories; and thirdly to derive indices of the amount of illegal activity recorded per unit of patrolling effort This gives a "catch per effort"˜index of the quantity of illegal activity.

The system is based on two assumptions: firstly that patrol reports are reliable, and secondly that in any given set of conditions a consistent relationship exists between the real quantity of illegal activity and the catch per effort index. In this respect, the system has the same features and problems as strip census methods, and under ideal conditions could be used like them to calculate actual amounts of illegal activity. However, we emphasize that the primary purpose of law enforcement is deterrence of poachers, not generating data. The recording system must not detract from the performance of the patrol by adhering to strict sampling procedures. This limits the precision of the system which provides broad indices rather than precise figures.

The first step is measuring patrolling effort. Firstly staff time is divided into categories according to likelihood of contacts with poachers i.e. base time, off time, placement time and effective patrol time.



Elephants, Malawi [Hugo Jachmann]

Only the last category is used in calculating patrol effort, while the ratio of effective time to the other categories is a useful index of the efficiency and motivation of field staff. Effective time is defined as time spent on foot in the bush, away from roads and certain footpaths. The most useful measures of patrol effort are the number of effective patrol days and the distance patrolled.

We place great emphasis on the ability of patrol leaders to navigate and indicate patrol routes on a map. Special training in these techniques is required, and estimation of patrol distance is done by pacing if possible or by reconstruction and measurement of the route on a map. Accurate maps with many recognized place names are essential.

The second step is the recording of illegal activity encountered by patrols. We use a set of about 20 standardized categories including key animals killed (i.e. elephant, rhino etc), other animals killed, gunshots heard, armed groups seen, snares and traps, poachers' camps, sets of footprints, fish-

ing, tree cutting, beehives, cultivation, houses, livestock, motor tracks etc. It is important that the precise method of scoring each category is standardized. For an example, we score a group of poachers as 1, although the numbers in the group are noted. In the case of key animals killed, detailed data are recorded. In the case of elephant, there are 17 items including date of death; method of discovery; cause of death; tusks present or absent; if absent whether cut or pulled out; data on ivory if present; age at death etc., etc. These data are necessary to build up a picture of the mortality pattern of the population and to provide data required for the analysis of ivory trade statistics.

The data are recorded by trained patrol staff according to a standardized format, and are extracted by senior staff from the reports and from de-briefing interviews. The active participation of senior staff in patrols, data recording and data extraction, is of course essential. The patrol route is then drawn on a map and illegal incidents inserted. The patrol effort and the score for each class of illegal activity can then be compiled by area (i.e. on a grid) and by time (i.e. by month, year, etc.) From these data is derived the catch per effort index.

The data can be used in three main ways: firstly to monitor the performance and activities of patrol groups; secondly to monitor changes in the amount and type of illegal activity by area; and thirdly to assess the impact of illegal activity on the mortality of key species and on the trade in their products. An example is given in the following table, using data from Kasungu National Park.

The period from 1977 to 1981 showed an upsurge in elephant poaching, coupled with a low level of patrol efficiency indicated by the few arrests and captures of firearms and the high percentage of placement time. In 1982, the Park came under new and active leadership; arrests rose sharply to 239 with 48 firearms, the motivation of the field force rose as indicated by the drop in placement time, and the number of elephants killed by poachers fell from 55 in 1981 to 7 in 1983. One should notice, however, that while elephant hunting has fallen sharply, the other classes of illegal activity, mainly involving minor offences, have continued to rise.

This brings us to the sociology of illegal activity. In Malawi, illegal use of wildlife resources falls clearly into two classes; firstly hunting of large animals with firearms, (mainly muzzle-loaders) by a relatively small number of "professional" hunters; and secondly, the collection of a wide variety of mineral, plant and animal products from the bush by subsistence agriculturalists including men, women and children. The former class we call "serious offences"; this class is readily susceptible to investigative techniques as in all successful anti-poaching campaigns, and is relatively easy to control. The other class of "minor offences", makes up the great majority of illegal activity, and is extremely hard to control because it is so diffuse. In a densely populated country like Malawi, minor offences can constitute a major influence on wildlife communities.

In allocating law enforcement effort, it is first necessary to decide on what level of illegal offtake is acceptable. With elephant, an annual offtake of about 3% is usually acceptable; with rhino or gorilla on the other hand, no offtake may be acceptable. In Malawi, the main species at risk is elephant, and in our conditions, we estimate that 1 Game Scout per 50km^2 provides adequate protection if properly led. This estimate is based on extrapolation of the catch per effort curves to their points of inflexion. Adequate protection of rhino requires higher staff densities.

Evaluation of law enforcement methods indicates that for serious offences by far the most effective method is investigation based on detailed intelligence work outside the conservation areas; for minor offences, a high intensity of patrolling in priority areas is required. An important point is that elaborate equipment, such as vehicles, radios, aircraft and even tents, can have the effect of reducing the effectiveness of a field force by reducing flexibility and mobility. This is important in assessing project submissions of this type.

Our experience in Malawi indicates that illegal activity can indeed constitute a real threat to wildlife species or communities, but that the situation is far from hopeless. Our data indicate that the people of Africa (among whom I count myself) have demonstrated both the will and the ability in conservation areas. I personally am more optimistic now, about the future of wildlife in Africa, than at any time in the last 20 years.

Introduction

	1977	1978	1979	1980	1981	1982	1983
Elephants killed by poachers	16	15	26	35	55	29	7
Catch per effort, all offences	0.309	0.375	0.617	0.770	0.606	0.638	*
Catch per effort, serious offences	0.078	0.084	0.140	0.122	0.229	0.136	*
Total patrol days	686	779	708	670	840	852	*
Total placement days	211	197	228	235	175	148	*
Percent placement	31%	25%	32%	35%	21%	17%	*
Total arrests	54	26	12	49	54	239	*
Firearms captured	0	0	3	6	6	48	*

* Data not yet available

R.H.V. Bell

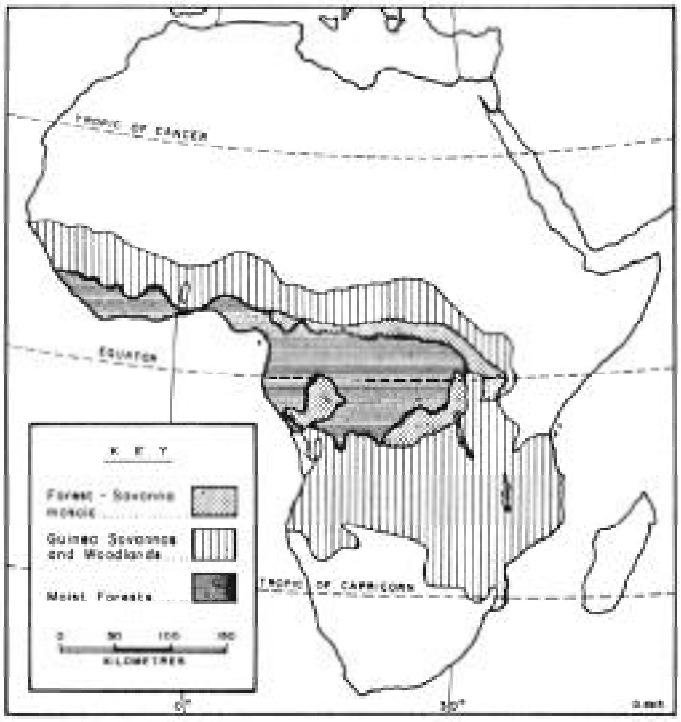
Why do Elephants Destroy Woodland?

Since the onset of colonial contacts in the last century, a fundamental change in land use patterns and life styles has taken place in Africa. The human population has increased manifold and most parts of Africa now consist of human settlement surrounding a few islands of wilderness, which are maintained by force of legislation in the form of conservation areas. Over the past forty years, elephant numbers have been rapidly increasing in some of these conservation areas, firstly as a result of law enforcement, secondly as a result of immigration of elephants from areas progressively settled outside and, thirdly as a result of Park management in the form of installation of artificial water supplies (i.e. Wankie National Park, Zimbabwe; Kruger National Park, South Africa and Tsavo National Park, Kenya). The massive build-up of elephant numbers was followed by a decline in woodland density due to a combination of tree destruction by elephants and burning (Laws, Parker & Johnstone, 1975; Caughley, 1976; Barnes, 1980 and Lewis, 1982). In a number of Parks this has led to the disappearance of large areas dominated by *Acacia* and *Commiphora* woodland and local extinction of tree species like Baobab *(Adansoni digitota),* which is highly favoured by elephant. The elephant were not capable of responding to these self-inflicted radical changes in the food supply, firstly because migration to better feeding grounds was usually difficult on account of human settlement and illegal activity and secondly because changes in the reproductive rate have a time lag (t) with a length equal to the age at onset of reproduction. Even if infant mortality would increase to a full hundred percent, the size of the breeding segment of the population would continue to increase for a period equal to the time lag (t), without significant changes in the calving interval and age at attainment of sexual maturity (Jachmann, 1984a & b). For these reasons it is not advisable to pursue a 'laissez-faire' management under conditions of elephant overabundance. After a long period of drought in 1972, laissez-faire management in the Tsavo National Park led to heavy mortality of elephants of all age-classes. In other Parks in Africa the culling of elephants was annually carried out as a management practice and appeared to be successful (Wankie - now known as Hwange -and Kruger National Parks).

We have now reached the point where we ask if modification of woodland by elephant is a natural phenomenon that is part of a cyclical relationship always existing between woodland and elephants (Caughley, 1976) or, if true equilibria between woodland and elephants are indeed possible under some ecological conditions. The installation of artificial waterholes and compression of elephants into sanctuary areas may be factors contributing to the rapid decline in woodlands. However, other factors are likely to be involved, while the causes differ depending on the type of habitat.

In this short contribution we suggest that a major factor contributing to habitat degradation by elephant is a maladapted feeding strategy, as most of the present-day elephant populations in Africa probably have evolved in the moist forests and Guinea woodlands of Central Africa. In order to clarify this hypothesis we shall first examine elephant feeding behaviour.

Tree utilisation



Utilisation of trees by elephant can be subdivided into five main categories: (i) consumption of fruits, (ii) defoliation and breakage of twigs and branches, (iii) debarking and consumption of woody material of the trunk, (iv) consumption of roots and, (v) breakage and pushing over of the tree. Depending on the amount of damage, both the third and fourth categories may be fatal to the tree in combination with fire, while the fifth category will definitely kill the tree. This last category is most interesting as the action does not usually provide the elephant with extra food he would have been unable to obtain without destruction of the tree, while in addition, the tree is lost for future foraging. According to Douglas-Hamilton (1972), Croze (1974) and Guy (1976), the uprooting and pushing over of trees by elephant is more a social display than a feeding necessity. However, in Kasungu National Park, Malawi, the felling of trees by elephants appeared to be part of a feeding strategy that leads to increase of browse production of preferred height-classes and of preferred species and materially improves the availability of food for elephants during the dry season (Jachmann & Bell, unpublished; Jachmann, 1984b). It has also been shown by other workers in this field (cf Olivier 1978) that the successional climax of a woodland or forest is certainly not the most productive stage and that food availability for elephant can be as much as factor 2.6 times higher in secondary rainforest as opposed to primary rainforest (Olivier. 1978).

The vegetation of Kasungu National Park is predominantly composed of *Brachystegia* woodlands (Guinea woodlands). Guinea savannas and woodlands, dominated over wide areas by *Brachystegia, Julbernardia* and Isoberlinea trees, are situated on the ancient and infertile soils of the Central African plateau and support low elephant densities. As pointed out by Bell (1981a), the conditions under which elephants are likely to have a substantial impact on the vegetation (in the absence of

poaching) are those that favour both tree and elephant production, i.e. soil conditions of medium to high nutrient status and high infiltration rates favouring plant biomass production. The soil-water dynamics of Guinea woodlands generally favour plant biomass production; however, the low nutrient status of the soils effects a low level of feeding efficiency and inhibits production of higher trophic levels. In Kasungu National Park, total rainfall (about 800 mm/year) and soil-water dynamics effect a high rate of coppicing when trees are killed by elephant and fire, resulting in a dense coppice regeneration, which is found to be an equilibrium phase of Brachystegia woodland (Bell 1981b). However, under semi-arid conditions, in areas where soil-water dynamics favour grass growth, the coppicing rate is likely to be low, while in addition fires are hot due to grass biomass and woodland areas may be modified by elephant (i.e. Sudan savannas and woodlands dominated by Acacia and Commiphora species). In certain Rift Valley areas like the Luangwa valley in Zambia, the production of all trophic levels is extremely high and local overabundance of elephants results in the disappearance of certain highly favoured tree species like Baobab, without intensive modification of large areas of the habitat (with the exception of some of the mopane woodlands).

Early over-exploitation of Africa's elephant population

The figure shows the moist forests of Central Africa, the Guinea savanna and woodland belt and an intermediary vegetation zone of forest savanna mosaics. The figure is a generalization as it does not show the montane habitats and Rift Valley areas, while the Guinea belt is actually a mosaic of savanna and woodland areas. About 60-70% of the elephants in present-day Africa occupy the moist forests and Guinea belt of the central part of the continent (after I. Douglas-Hamilton, 1979). Another approximately 5% occupies Rift Valley areas situated within this region, like the Luangwa and Zambezi valleys in Zambia and Mozambique. Intensive habitat modifications by elephant have been reported for a number of areas, mostly situated outside the moist forests and Guinea belt.

If we go back to the 17th century when large scale elephant hunting for ivory started, we see that large populations were eliminated over wide areas (Spinage, 1975). As the ivory had to be hauled overland by foot or by pack-animals, intensive exploitation of elephant populations started in the coastal regions and approximately halfway through the 19th century, elephants had been exterminated over large areas of West Africa and Africa south of the Zambezi (Spinage, 1975). By the end of the 19th century, elephants were completely absent from extensive areas of East Africa where the Arabs had control over the ivory trade (Spinage, 1975). Elephant hunting in Central Africa was less intensive, because the ivory had to be transported over vast distances to reach the coast, while in addition the region was less accessible than the largely open areas of southern and eastern Africa. The moist forests of Central Africa were occupied by the somewhat smaller forest elephant, while the eastern and southern regions bordering on these forests were most likely occupied by populations with a large degree of interbreeding between the savanna and forest elephant During periods of over-exploitation of elephant populations in East and South Africa, the process of elephant dispersal was accelerated, while the Central African population acted as the centre from where migration took place. We would like to suggest that the majority of present-day elephant populations occupying eastern and southern Africa are descendants from this main Central African population, implying that the feeding behaviour of these elephants is similar to that of the elephants currently occupying the moist forests and Guinea belt of Central Africa. If this assumption is true, the destruction of woodland by elephant would not only be due to overabundance in combination with fire and management actions, but also to a maladapted feeding strategy. Undoubtedly, the compression of elephant in combination with the time lag effect in the reproductive rate play an important role in the modification of habitats. Cyclic relationships between trees and elephants, if existing at all, are likely to be masked by trends in elephant hunting over the past centuries (Spinage, 1975).

Conclusion

Increasing browse availability following pushing over of trees is a feeding strategy which is appropriate to moist oligotrophic woodland and forest This strategy may be of general significance in the evolution of elephant ecology. The majority of African elephants live in the moist oligotrophic biome, while the remaining animals are most likely descendants from this central African population. This implies that the elephants causing the classic management problems as to modification of the habitat may be a maladapted minority.

Hugo Jachmann and R.H.V. Bell

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Kenya's Black Rhinos in Addo, S. Africa

Introduction

The black rhino population in the Addo Elephant National Park (of the subspecies *Diceros bicornis michaeli)* was established from animals introduced from Kenya in 1961 and 1962. In 1977 three bulls of the Zululand subspecies *(D. b. minor)* were introduced to augment the population. In 1980 the IUCN/SSC African Rhino Specialist Group sent a request to the Board to remove the Zululand bulls and any mixed parentage progeny so that a pure population of the Eastern Kenya subspecies *(Diceros biornis michaeli)* could be maintained. Two of the Zululand bulls were removed in May 1981, the third animal which had been castrated in 1979 because of its undesirable congenital one-eared condition was left at Addo.

Removal of hybrids

The second phase of the removal project, which was the capture of the calves of possible mixed parentage was done during May 1983. The capture operation was preceded by a survey carried out by helicopter during which the black rhino were counted. As all individuals in the Park in 1977 were caught and marked, and all subsequent births had been recorded, it was possible to account for 100% of the known population. Some confusion in the field arose from one unmarked hybrid animal being counted twice. However, subsequent extensive flying and two repeat counts during which all known individuals were seen eliminated this problem.

Eight calves were born after the introduction of the Zululand bulls. One of these was conceived before their arrival four were conceived after their removal and three were conceived while they were at Addo. The Zululand animals look markedly different in the field being smaller and having a smooth skin, as opposed to the larger *D. b. michaeli* animals with rough and strongly grooved skin. The grooves or folds were particularly conspicuous on the flanks of the *D. b. michaeli* animals.

Of the three animals captured, two males looked like hybrids and a female looked like a *D. b. michaeli* animal. However, all three were consigned to the National Zoological Gardens in Pretoria. An adult female held by the zoo, which came from eastern Kenya was translocated to Addo during the same operation. Within three months the translocated cow at Addo had died of undefined causes. The female at the zoo died of a respiratory infection which followed on treatment to nasal injuries received during transport.

Status of animals at Addo

There are at present 14 *D. b. michaeli* animals at Addo and one castrated *D. b. minor* bull. Of the fourteen, five are adult cows born at Addo and ranging in age (as at February 1984) from 9-20 years. All of them have calved within the past four years. One cow, originally from Kenya, at least 32 years old has not calved since 1978 and may well be too old to breed again. The immature animals presently at Addo are three females and two males. The overall sex ratio of the *D. b. michaeli* animals is *5* males, 9 females. Prospects for reproduction and a rapid increase in this population are therefore very good.

Diceros bicornis michaeli *in Addo National* Park

Anthony Hall-Martin

Management

The Addo black rhino are confined to that part of the Park which is enclosed by the elephant proof Armstrong Fence. Since 1977 when the rhino were released from their 210 ha enclosure their available range has been expanded from 4,000 ha to 5,200 ha and in March 1984 this was increased to 6,800 ha.

Conclusion

Initial management problems discussed in detail by Hall-Martin and Penzhorn (1977) severely limited the population growth potential of the Addo *D. b. michaeli* population. The unfortunate introduction of *D. b. minor* animals and its aftermath was a further setback to this population. However, these problems have all been overcome, the available range has been enlarged and the prospects for the future of this population are excellent.

Anthony Hall-Martin

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THE EVIDENCE OF TUSKS IN THE IVORY TRADE

Elephant Hunting Patterns

In the last AERSG newsletter we presented mathematical techniques for determining the sex and age of elephants from tusk measurements. We will now present a mortality pattern developed by their use, and discuss its use as a basis for making well-founded guesses as to the hunting patterns which produce the tusks in the ivory trade.

The empirical hunting mortality pattern for East African elephants is presented in Fig. 1. It was calculated from data collected by Parker (1979: Table 175). Examining tusks in Hong Kong warehouses, he recorded country of origin, sex (determined by visual inspection) and lip circumference. Using the proportion of elephants taken from each category is directly proportional to tusk weight.

Selective hunting of a young population is the only simple way to get the correct pattern of peaks in the mortality pattern. Natural mortality occurs early or late in life, and the only change with population structure is the relative proportion dying early and late, not age of death. Random cropping, which takes elephants in direct proportion to their numbers in the population, will produce a peak in the middle only if there are more animals of middle years than there are young. This sort of distribution is possible, but unlikely.

his data from tusks originating in Kenya and Tanzania we

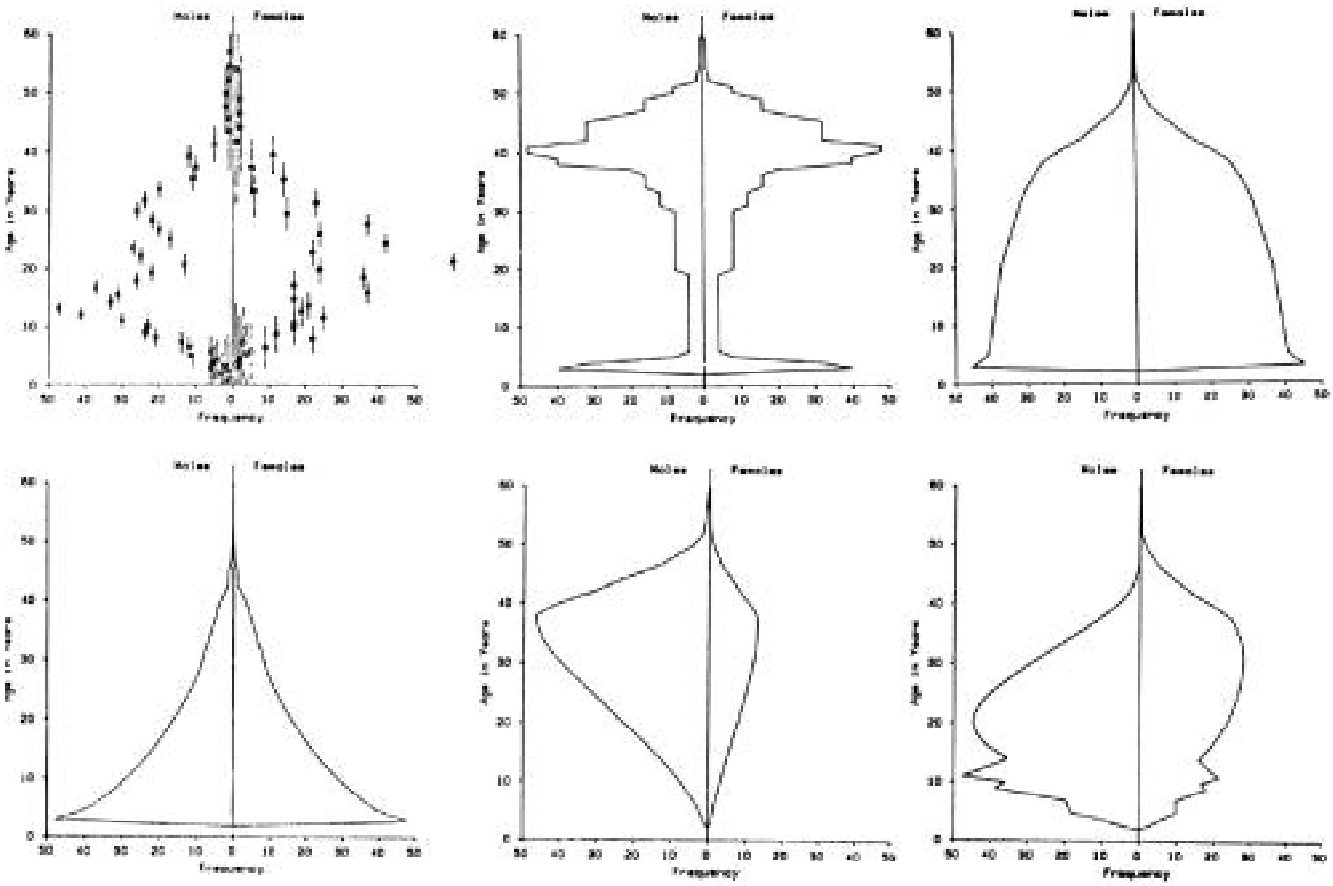

Fig. 1. Mortality patterns represented by tusks. Top, left to right Empirical hunting pattern for Kenya and Tanzania (1977); natural mortality in a mature population; random cropping from a mature population. Bottom, left to right Random cropping from a young population; selective hunting from a mature population; selective hunting from a young population. Frequencies are absolute for the empirical population only. The rest are adjusted to be on the same approximate scale.

calculated estimates and confidence intervals for the ages.

The overall pattern is for the number killed first to increase, and then decrease with age. This pattern produces a peak in the middle of the age distribution, with the peak for males occurring at an earlier age than that for females.

A variety of possible scenarios, including different hunting techniques and intensities on different-aged populations was computer-simulated in an effort to duplicate the pattern in Fig. 1. The pattern which appears to be most similar is selective hunting of a young population. Selective hunting is simulated by multiplying the base hunting intensity by the mean tusk weight of an elephant's age and sex category. As a result, selective hunting of likely populations will produce peaks in the middle of the distribution. With a mature population, the hunting mortality peaks will occur late in life. With a young population, the number killed diminishes late in life because there are few old animals to be hunted, while the youngest animals will be hunted very lightly because of their small tusk size. Animals in their middle years will be reasonably numerous and hunted very intensely. Males will be hunted more intensely than females at a young age because their tusk growth is more rapid, producing a mortality distribution very similar to the empirical one.

Determining the hunting pattern is useful because it allows well-founded speculation about its long-term consequences. This is a more complicated procedure, because the pattern determined to be the best one can be produced by

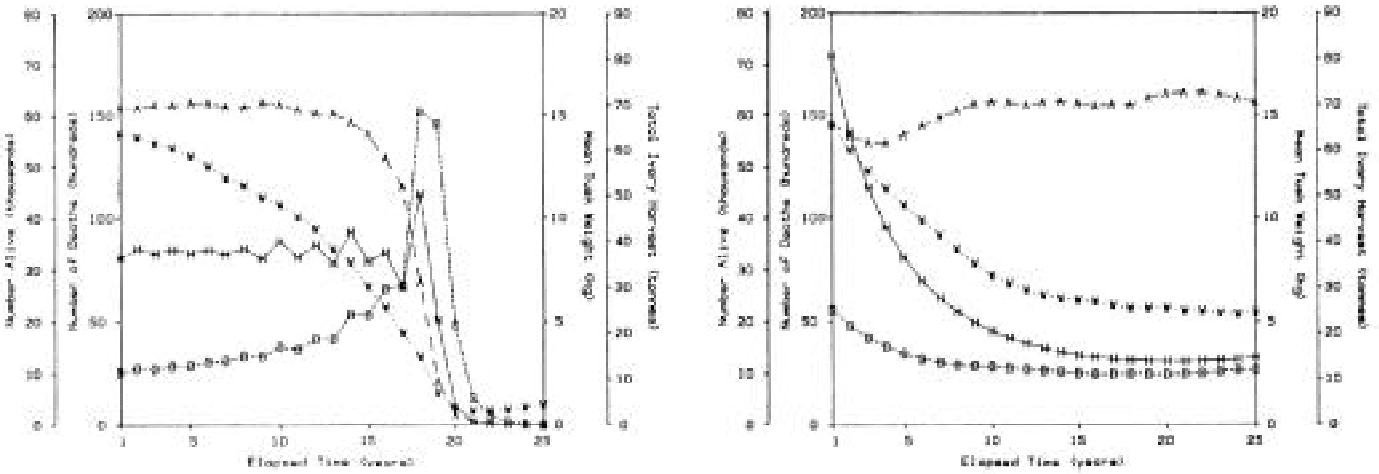

Fig. 2. Simulated patterns of harvest and mortality for different hunting strategies. Left Increasing base hunting intensity with constant harvest. Right Constant base hunting intensity. Key: A - Number alive, D - Number of deaths, H - Total ivory harvest W - Mean tusk weight.

different means. It is worth examining the two most different techniques to consider their implications.

The pattern presented was actually produced by starting with a mature population and simulating selective hunting with a target harvest 150% the amount produced by natural mortality alone. Hunting was increased to maintain this harvest as the population became younger, and birthrate increased to attempt to maintain population numbers. The pattern shown was produced after a simulated 15 years.

An essentially identical pattern can be produced by maintaining a constant base hunting intensity. The ivory harvest diminishes steadily, in contrast to the previous example, but the population effects are the same. The population becomes younger as a result of heavy hunting among older animals and an increased birthrate to compensate for their loss, and the pattern of animals killed is the same as for the scenario above.

Though these different scenarios produce identical hunting mortality patterns in their 15th year, they can be distinguished by their histories (Fig. 2). The key differences are in the number of elephants killed and the total ivory harvest.

In the population being hunted with steadily increasing intensity, the ivory harvest has remained stable, with the number of elephants killed to maintain that harvest increasing as mean tusk weight declines. With a constant base hunting intensity, mean tusk weight decline has resulted in both a slight decrease in total deaths as selective intensity declines, and a considerable decline in total harvest. Though the mortality patterns are similar, other aspects of their past are different.

Their futures are even more different. The population being hunted with increasing intensity is on the verge of collapse, while that hunted at a constant intensity has settled into a stable pattern in which all measures will remain relatively constant. These different futures provide a real impetus toward deciding which is the actual pattern.

This is a difficult task, since there is great variation in the local patterns. The continental pattern, roughly, is for the total ivory harvest to remain constant, while mean tusk weight declines and number of elephant deaths increases (Parker and Martin, 1983). As we have shown, a decline in mean tusk weight does not, by itself, necessarily indicate a situation of population decline. However, in combination with a constant harvest and, therefore, an increasing number of elephant deaths, it very well might.

The simulated scenario of increasing hunting intensity could be achieved in reality by more intense hunting by more individuals. This possibility has been suggested by both Parker and Martin (1983), who mention human population increase as a threat to elephants, and by Douglas-Hamilton. (1983), who points to an even more rapid increase in the number of automatic weapons available. Either of these explanations, or both in combination, could provide the hypothesized increase in hunting intensity.

Although this explanation as to what the pattern of ivory in the trade represents makes sense on a number of levels, it should not be accepted too hastily. There are large numbers of individual elephant populations in Africa, doubtless hunted by a variety of techniques at a number of different levels of intensity. A simple explanation for a complicated situation may be substantially correct, but should be treated cautiously.

If it would be premature to view our results with alarm, it would nevertheless be unreasonable not to view them with concern. They constitute one kind of evidence that the African elephant population may be in decline due to hunting. As many other kinds of evidence as possible should be examined as well. If there really is a danger, it should be possible to present the case for it convincingly, and to determine measures which could reduce it.

Tom Pilgram ARC and David Western

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Few places exist in Africa where populations of elephants

Promoting Conservation in the Luangwa Valley, Zambia

THE LUPANDE DEVELOPMENT WORKSHOP

and rhinos are free from the immediate threat of poaching and the ultimate threat of habitat destruction. Despite the immense area of Luangwa Valley's parks and wildlife management areas, which collectively total over 50,000km^2, these threats are becoming increasingly real for the future survival of Luangwa's elephants and black rhinos.

Recent research has shown that conserving Luangwa's elephants will require managing the population as one that regularly leaves the park for preferred forage outside. Such movements are well established from many years of seasonal traversing. These movements, however, are resulting in a high incidence of crop damage by elephants, related possibly to an increased frequency of farm plots. The conflict between man and wildlife is rarely more dramatic than elephants feeding on a village garden of maize or sorghum, a sight that is symbolic of how restricted elephant range has become in recent years. The Luangwa Valley, however, is relatively young in its progression of land change; but the early indicators suggest that Luangwa Valley is following the route so commonly practised elsewhere: more maize fields and less elephant range. This, of course, is an over- simplification of what is happening to Africa's wildlife, It does, however, underline the basic problems facing wildlife in Luangwa Valley: how to integrate rural development with wildlife conservation.

With so much sustainable potential from wildlife resources in the Luangwa Valley, one wonders why the need to conserve wildlife is not self evident. The bitter irony, however, is that wildlife has been poorly developed and offers little to local residents who live on much of the same lands as the valley's wildlife. This, of course, jeopardizes the long-term conservation of wildlife. The survival options of rural villagers are few. Traditionally it has been largely slash and farm. With the higher costs of living, the options now include illegal killing of wildlife for commercial profits, with greatest profits earned from elephants and rhinos. Another worrisome trend that will weaken the development potential of Luangwa's wildlife is the bias in international development aid toward agriculture, which is introducing more advanced farming methods. Undoubtedly, such methods will increase the rate of land clearing in Luangwa Valley.

Such chains of events are well known elsewhere in Africa. The scenario often results in the eventual deterioration of land productivity and land quality. This is especially true when extension services and governing bodies are unable to monitor and regulate environmental stresses in the ecosystem, as is usually the case in developing African nations. No one can put a price tag on what it will cost to rehabilitate land before the damage has been done, but for countries with low income earnings, it is unlikely such costs can or ever will be met. To avoid such unnecessary penalties of poor land-use planning in the Luangwa Valley, a government level conference was convened in the Luangwa Valley on the shady banks of the Luangwa River at a remote wildlife camp called Nyamaluma. Its purpose was to discuss and endorse recommendations for land-use planning and wildlife conservation in the Luangwa Valley. From 19-22 September, over 35 delegates attended the conference and brought with them their expertise in resource management, government land-use policies and rural development.

The conference was called the Lupande Development Workshop, since discussions were largely based on studies dealing with land-use development problems in Lupande Wildlife Management Area (see Fig. 1). Considered representative for much of the Luangwa Valley, the Lupande offered a model for understanding land-use problems of the whole Luangwa Catchment.

The workshop was not just a gathering of wildlife protectionists but was a balanced assembly of people representing many aspects of land development from agricultural aid organizations to rural economists. It provided 4 days of data presentations, discussions and debates on the issues and problems most relevant to the future development of the Luangwa Valley and its wildlife resources. By the final day the delegates were expected to produce a set of resolutions that would launch a definitive campaign to manage and better utilize the Valley's great wealth of natural resources while assuring their long-term conservation.

Under the effective chairmanship of Chief Research Officer of Zambia's National Parks and Wildlife Service, Mr Gilson Kaweche, the workshop achieved its goals with a level of importance that has made this workshop an important first step in achieving a lasting wildlife future for Luangwa Valley. Together with a preamble, the delegates endorsed the following resolutions to serve as a broad course of action in guiding all future initiatives of resource management in the Luangwa Valley:

"The Luangwa Valley is an asset of national and global importance. This asset is seriously endangered by poaching and lack of proper wildlife and land management. In the long term, rapid population growth in the Valley and the adjoining areas will aggravate the situation.

"The workshop identified the urgent need for integrated long-term regional planning, resource conservation and land-use rationalization in the Luangwa Catchment. It is necessary to start a self-sustaining management of natural resources to support balanced development of both human and wildlife populations.

"The workshop therefore recommended that:

1) A Luangwa Development Project (LDP) be established to develop the Luangwa Catchment as a model for efficient management and utilization of wildlife and other resources.

2) Significant funds should be mobilized from domestic and international resources to establish and support the LDP in its initial stages. Toward this end, it is essential that Luangwa Catchment's special significance be acknowledged and supported both within Zambia and gobaJly. Zambia, therefore, should seriously consider becoming a signatory to the UNESCO World Heritage Convention and action should be taken immediately to declare the Luangwa Valley as a World Heritage Site.

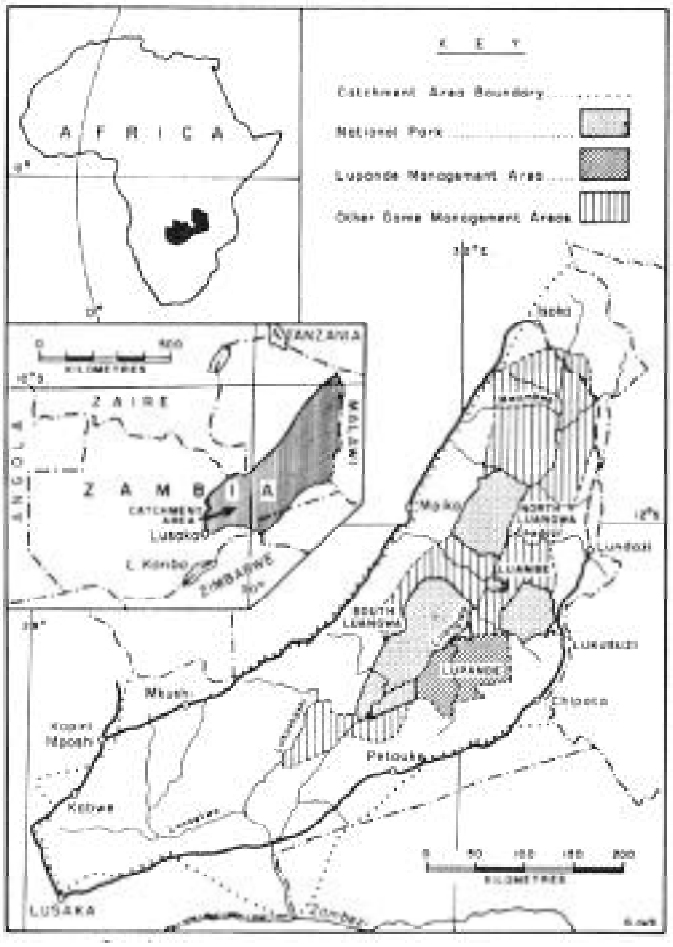
3) Substantially increased funding and staff be immediately allocated to all organizations engaged in combating poaching. Without such action, all other initiatives to develop the Catchment's resources will be abortive.

Whereas the ecology of the savanna elephant has been in-

4) The people of the Luangwa Valley's Wildlife Management Areas must participate in the development and management of the Catchment and benefit from the yields from those resources.
5) Extensive research pertaining to the management and development of the Luangwa Catchment is required and hat a Luangwa Research and Education Institute should be established.
6) An interim planning group, based within the Provincial Planning Unit in Chipata, be established to prepare project designs and budgets to support development of the LDP within one month."

The real significance of this workshop will be judged as the Government of Zambia studies these resolutions and the specific management proposals that the Interim Group has already presented. Zambians and friends of Zambia await anxiously for a new course that will lead the development of Luangwa Valley, the jewel of Zambia's natural resources, to a future where both man and wildlife can coexist. The Lupande Development Workshop is clearly seen as the first step in the right direction. The beneficiary will be more than the endangered rhino arid elephant populations or the rural villagers who share their lands with these species of wildlife. The beneficiary will be a major ecosystem in southern Africa with a heritage and resource potential of monumental importance to this continent.

Dale M. Lewis



Luangwa Catchment Area including national parks and game management areas

Ecology of The Forest Elephant in Tai National Park, Ivory Coast

vestigated in numerous studies, research on the ecology of the forest elephant in Africa began only a couple of years ago. This is mainly because of its habitat, the tropical rain forest.

In the tropical rain forest direct observations are almost impossible because of the dense vegetation. The thick forest canopy cuts out nearly all the sunlight.

In Tai National Park, Ivory Coast, an attempt was made to gain some knowledge about the hidden life of the forest elephant. Tai National Park covers 340,000 ha which consist mainly of primary rain forest. This offers possibilities for studying larger rain forest mammals, particularly elephants.

The methods used were mainly based on indirect observations. Signs of the elephants such as footprints, trails, droppings, browsing patterns etc. were noted. This was done along fixed transects characterizing different vegetation types of the Tai National Park (Fig. 1). Transects 2, 3 and 4 were covered by primary rain forest, transects 1 and 5 primary and secondary vegetation change and transects 6 and 7 were characterized by secondary forest and bush vegetation. All these transects are strip transects with a width of 3m each and a length of 8km (h_2, h_3, h_6), 7km (h_5), 5,5km (h_1, h_7) and 4,5km (h_4). Over three years, patrols were carried out in a 39-day cycle, on average.

The forest elephant is well adapted to its environment. In comparison with the savanna elephant, its body size is smaller, and its ears are relatively small and round. Its head is bent forward, with thin, slightly curved tusks going down to the ground.

Like many species of mammals living in the rain forest, the elephant forms only small groups of about three to four animals on average (Fig. 2). The formation of larger herds, as known in savanna areas, was not observed. Only in swamp forests are aggregations of 20 to 40 animals possible.

In the tropical rain forest there is enough food and water all the year round, so the elephant is not forced to travel great distances to meet those demands. During the rainy season, however, the elephant shows a higher mobility than in the dry season. During the hours of daylight the elephant moves about 5km on average; its annual home range is estimated to be about 150 to 200km^2.

The primary rain forest is the original habitat of the forest elephant, a habitat now declining on a huge scale because of forestry and agriculture. In the Ivory Coast, statistics show that between 1956 and 1966 approximately 280,000 ha of rain forest were exploited per annum. Between 1966 and 1974 this figure rose to 450,000 ha. In 1982 only about 12% of the area which was still covered by primary rain forest in 1956 remained, i.e. more than 90% of the country's original rain forest has been transformed into man-made landscapes or has been ecologically modified.

If the ecology of the forest is only slightly changed, e.g. in selective logging, the forest elephant can adapt itself to this new environment. The clearing of the rain forest could even be attractive to the elephant, depending on the extent and

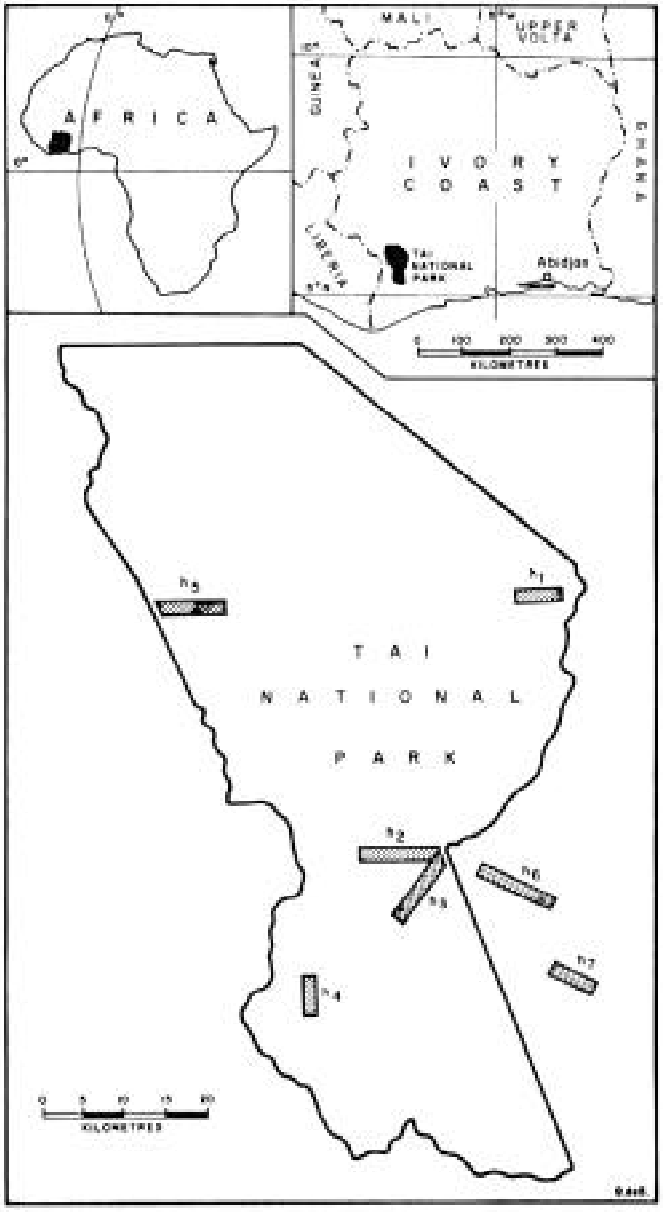


Fig. 1

age of the modifications. Elephant densities in these habitats were observed to reach 2.6 animals per km^2 on average in comparison with primary forests, where densities are under 0.5 animals per km^2.

There is a distinct attraction to areas which are influenced by logging activities. The preference of the secondary rain forests can be confirmed by the x^2 test. As a result of the clearing of the original forest a new heliophile vegetation has produced a richer range of fodder plants containing a greater amount of crude protein than sciaphile species. A nutritive analysis of heliophile fodder plants selected by elephants shows a crude protein content of 18% compared with 10% in plants of the primary rain forest, which are much less used by the elephant. Furthermore, the alternating occurrence of open, grass-covered areas and dense vegetation is highly appreciated by the forest elephant.

Gunter Merz
University of Juba

RHINO WORKSHOP AT PILANESBERG

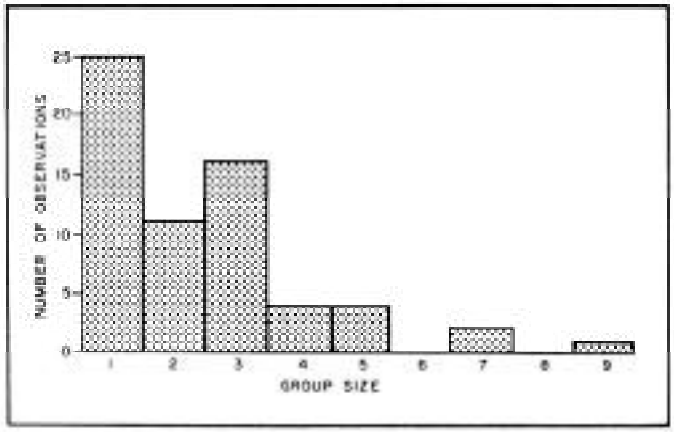


Fig. 2

News in Brief

Following an initial suggestion by Peter Hitchins, that the status of rhinos in southern Africa should be investigated, a workshop on the topic was sponsored by the Endangered Wildlife Trust and hosted by the Pilanesberg Game Reserve in Bophuthatswana. Fifteen delegates, including a colonel of the South African Police, several officers of nature conservation authorities, zoological gardens and non-government organisations, gathered in February 1984 for two full days of discussion on the rhinos of South Africa and Namibia. The main focus of attention of course was the black rhinoceros whose statistics in South Africa have been largely covered by Martin Brooks in the previous newsletter.

Three subspecies of the black rhino occur in the two countries. About 610 animals of the *minor* subspecies were estimated for South Africa (including 21 in Pilanesberg), and the Natal population has 19 animals per year for translocation. The population in the Kruger National Park, currently estimated at 110 animals, has a great potential for expansion. South Africa also holds 14 *michaeli* rhinos in the Addo Elephant National Park; these are genetically pure as hybrids have been removed (and one *minor* bull castrated).

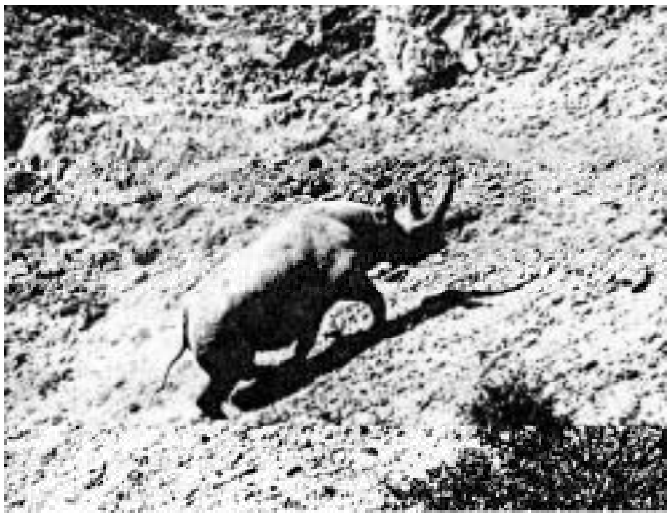
About 400 animals of the nominate subspecies are estimated for Namibia, of which 350 occur in the Etosha National Park. This hatter population is expanding and animals could be translocated to three other game reserves in the north of the country. Meanwhile, the desert rhinos of Damaraland and Kaokoland have declined to an estimated 50 and .5 animals respectively. These animals hive on communally-owned land, and they are very vulnerable to poaching; they are the only black rhinos not in a game reserve. There is considerable concern over their future, and as befits

a unique population of animals, it was agreed that they should receive special attention and be conserved *in situ* rather than be translocated.

The southern subspecies of the white rhino is considered safe, and little concern was voiced for its future. Its numbers were estimated at nearly 3,000 in South Africa, 70 in Namibia and 217 in Pilanesberg. In contrast to the distribution of the black rhino, the white rhino occurs widely throughout South Africa, as a good proportion of its numbers (estimated 530) now lives on private game ranches, albeit usually in small numbers per ranch. The white rhino population in Natal allows about 130 animals per year for translocation.

It was agreed that zoos have a definite role to play in the conservation of both species of rhino, particularly with regard to public education and to maintaining a viable captive population. There are at least 200 black rhinos in the world's zoos (only three in South Africa), and they are now breeding. But the workshop called on zoo directors to maintain genetic purity of subspecies if breeding is to be attempted. However it was admitted that whilst distinguishing'*michaeli'*and *minor* is fairly easy, it is not with *bicornis* and *minor.*

Several resolutions were suggested with regard to the trade in rhino products. The workshop called on the IUCN to continue monitoring the international trade, and requested that CITES take more interest in it and investigate the possibility of using disciplinary action against members not conforming. At a regional level, the workshop will recommend that rhino products be stockpiled until further notice, that nature conservation ordinances and fines with regard to the rhino be rationalised throughout, and that a wildlife trade investigating officer be set up somewhere in southern Africa. Very importantly, SWA/Namibia announced that it has now stopped auctions of rhino products, and although not a member of CITES it will comply with regulations.



Desert rhino, Namibia [Koos Bothma]

We expect to issue a fuller account of the proceedings for distribution to the appropriate authorities and other interested bodies.

P.J. Mundy
Endangered Wildlife Trust

ELEPHANT POACHING IN THE CHOBE NATIONAL PARK, BOTSWANA

Botswanas Chobe National Park has for the last two years experienced an upsurge in the killing of elephant by poachers from the eastern Caprivi in Namibia.

It was two years ago that Botswana's Department of Wildlife, National Parks and Tourism placed a ban on all elephant hunting in order to arrest poaching from within Botswana and to take a careful look at its elephant populations.

The Endangered Wildlife Trust and the University of the Witwatersrand were asked to assist in surveys to determine numbers and to date some 22,000 elephants have been estimated in the north excluding the Okavango Delta and Moremi Wildlife Reserve.

Clive Walker
Director, Endangered Wildlife Trust

SUDAN ELEPHANT CAMPAIGN EFFECTIVE

The alarming slaughter of elephants in South Sudan last year impelled the AERSG to launch a series of diplomatic and publicity campaigns aimed at urging Sudan to control the poaching. In response to these initiatives, Sudan banned the export of raw ivory by ministerial order from 1 January 1984. AERSG has warmly congratulated the Sudan Government on their action.

L. Vigne

DESERT ELEPHANT AND RHINO: EWT HELPS

Plans to have four million hectares of the Damaraland region of Namibia proclaimed as a Park collapsed earlier in the year, causing concern for the continued protection of the elephant and rhino.

Since 1978, the Endangered Wildlife Trust had assisted the Namibia Wildlife Trust's good work with aerial surveys, research and anti-poaching measures. Now, EWT is to take responsibility for the security of Damaraland's wildlife, with Garth Owen-Smith as Senior Field Officer along with his assistant and six game scouts from the Department of Agriculture and Nature Conservation.

The Trust held talks with senior officials in Xhonixas, the Damaraland administrative centre, on 5 April 1984, and again in Windhoek with the Department of Agriculture and Conservation, which will be ready to take over control from EWT at the end of 1984.

Continued co-operation of all involved is essential for maintaining the protection of the uniquely adapted desert rhinos and elephants of Damaraland.

L. Vigne

RHINO BIBLIOGRAPHY

A bibliography of publications on rhinos, gathered by Kes Hillman, is stored on the computer at the Species Conservation Monitoring Unit and print outs are available on request to: Jane Thornback, SCMU, 219c Huntingdon Road, Cambridge, England.

NORTH YEMEN NOW TAKES ONE HALF OF ALL RHINO HORN

The North Yemen Government outlawed -all imports of rhino horn on 22 August 1982. Esmond Bradley Martin, on behalf of the African Wildlife Foundation, recently visited North Yemcn and found that more than 50% of the rhino horn available each year on the world market was being exported to North Yemen, as opposed to 40% six years ago, and despite the official ban.

The horn comes mainly from Khartoum, even though Sudan is a signatory to the CITES Agreement. North Yemeni and Sudanese traders bring the 'black gold' through Sana'a Customs, often in their hand baggage. Some customs officials say they do not know about the ban. Smuggling of many goods is rife and uncontrollable in North Yemen. Esmond Bradley Martin states that all customs officers should at least be told about the ban, and asked to enforce it.

Craftsmen carve the horn into elaborate traditional dagger handles for North Yemeni men. Dealers collect the horn shavings and export them to the Orient for medicine. Banning this secondary trade, Esmond Bradley Martin suggests, would help lower the demand and threat to the rhino.

The population of North Yemen is increasing and given that 7.75% of males from the age of 12 require and can afford new rhino-horn dagger handles, two tonnes of horn a year are needed to meet the demand, excluding that from the 24,000 tourists to North Yemen who may be offered daggers as souvenirs. The media should impress upon the newly rich Yemenis and on the tourist trade the endangered state of the rhino.

The most effective measure which should be taken against the trade, however, would be stricter control on exports from source countries, especially via the Khartoum connection, Esmond Bradley Martin states.

L. Vigne

AERIAL SURVEY ANALYSIS COMPUTER PROGRAMME

There has been a need for some years for a simple programme for the analysis of systematic aerial reconnaissance surveys available to wildlife biologists and workers.

lain Douglas-Hamilton has now developed such a programme, written by Anne Burrill, which is suitable for most aerial sample surveys that follow the methods described by Norton-Griffiths in

Counting Animals, produced by African Wildlife Foundation, 1978.

The programme can extract and analyse portions of census zones and also merge different areas of the census zone. A more complete description is available on request, and copies can be obtained for the price of postage and disc or photocopying by contacting Dr lain Douglas-Hamilton, P.O. Box 54667, Nairobi.

lain Douglas-Hamilton

North Yemeni carver at work **[Esmond Bradley Martin]**

WWF/IUCN RENEWS SUPPORT FOR SELOUS

The Selous Game Reserve in Tanzania is undoubtedly the most important woodland savanna reserve in Africa. Its vast 55,000km^2 support the largest coherent populations of elephants, black rhinos, crocodiles, buffaloes and hippos in the world. There are approximately 1 00,000 elephants and 3,000 black rhinos within the Reserve. In addition, some 350 species of birds and over 2,000 species of plants have been recorded. As a result of these tremendous biological values, the Selous was recently declared a UNESCO World Heritage Site. The Selous has also been accorded the highest priority for field action by the African Elephant & Rhino Specialist Group.

To date, the vastness and inaccessibility of the Reserve have protected it from the human encroachment and poaching that have become so characteristic of other East African conservation areas. However, it is inevitable that human pressures upon the Reserve will grow, and have an increasingly severe impact. It is essential that the Tanzania Wildlife Division which is charged with the protection and management of the area, be adequately equipped to deal with these growing pressures.

Under a recently initiated project (No. 3173), WWF/IUCN is continuing its support to the Selous, and is helping to meet the most immediate needs of the Reserve. Spare parts for vehicles and aircraft are being purchased. Ranger equipment, medical supplies, radios, vehiches and motorcycles are also being provided. Although the original budget is for an initial period of two years, it is hoped that Project 3173 will evolve into a long-term support programme for this strategic wildlife stronghold.

Scott Perkin
Projects Officer, WWF/IUCN Regional Office, Eastern Africa

WORK PROGRESS IN GARAMBA NATIONAL PARK

At the very end of April we began the project in Garamba National Park to monitor the remaining northern white rhinos. The objectives of the preliminary work are to: (1) find out how many rhinos remain and of what sexes and ages; (2) evaluate the logistics of conserving them.

From ground and aerial survey work we can thus far identify 11 different individuals. The known individuals comprise: 4 adult males; 3 probably 4 adult females; 1 unsexed subadult; 1 male calf under 1 year old; 1 unsexed calf under 1 year old.

We do not know enough at this stage to draw any conclusions as to the exact number of rhinos remaining. Our immediate plans are to continue with intensive groundwork to verify further individuals and gather information on their behaviour and ecology, and to ensure that reliable guards are patrolling the rhino areas. Some further development of the monitoring programme will be carried out. The grass is roughly 1 to 1.5m tall at present.

We are extremely grateful to the many organisations and individuals who have made this preliminary and urgent work possible and effective. Acknowledgements will be made in the full report.

Kes Hillman and Mankoto ma Oyisenzoo

SOME POSITIVE NEWS FROM KENYA

One woman's wish to save rhinos has led to the construction of a rhino sanctuary in northern Kenya. Anna Merz visited the Craigs' acacia-savanna ranch in 1982, and discussed with them the possibility of a rhino sanctuary. With the Craigs' provision of 5,000 acres on Lewa Downs, Anna Merz paid for a 20km long fence from the "Ehefence" company to enclose the area for rhinos. Preparations for the sanctuary took a year to complete. The fence now stands at 2.40m and has seven electric wires, each one carrying 5000 volts. The fence is to provide the dual function of keeping rhinos in and poachers out, and also there is strict guard security.

By February 1984, black rhino translocation to Lewa Downs was able to begin, with the full support throughout of Daniel Sindiyo, Director of the Wildlife Conservation and Management Department. Invaluable help and hard work continue from Peter Jenkins, Senior Warden (Planning North) in the Department, and Francis Dyer, Sanctuary Manager, as well as the Craigs themselves. First to be brought to the sanctuary was a male rhino, captured near Nairobi National Park by the Capture Unit. The second rhino was a female, found by Anna Merz, the last rhino in Shaba Reserve. For four months, four guards protected her in Shaba, but despite this, there was fear that bandits might kill her and she was moved, still wild and desperate, to the safety of Lewa Downs. In the holding boma Anna Merz calmed her by the unique expedient of reading aloud to her for three days. Another male arrived from the Nairobi Park Orphanage. Finally, two more males and one female were brought by the Department Capture Unit from the Prettejohns' ranch, near Mweiga into the sanctuary. So far, therefore, Lewa Downs rhino sanctuary protects four males and two females and mating has already been observed once. Anna Merz is hoping to bring in three more black rhino females.

There are not only black rhinos in the sanctuary. A southern white rhino from California was recently introduced to the tame group of southern whites in Meru National Park to provide new blood, and the non-breeding male at Meru was transfered to Lewa. Possibly, Anna Merz says, some more whites may be introduced to Lewa to breed with the solitary male.

The vegetation in the sanctuary has been surveyed by Hugh Lamprey, and any changes since the introduction of the rhinos will be monitored.

What plans for the future? The gestation period for black rhinos is 15-18 months, and if breeding proves successful, Anna Merz hopes that funds could be raised to enclose eventually the whole 45-48,000 acres of Lewa Downs. One day when the demand for the horn has been successfully curbed, Anna Merz wishes to open the fence to the largely uninhabitated dry north and repopulate northern Kenya with black rhinos. Until that time, this "holding action" is the best safeguard for the rhinos.

L. Vigne

Book Reviews

Ivory Crisis, by Ian Parker and Mohamed Amin (Chatto & Windus, London 1983) £14.95

I was delighted to be asked to review Ian Parker's book; having seen Nigel Sitwell's caustic review in the *IUCN Bulletin,* September 1983, (reprinted from *New Scientist* 30 June 1983). I was confident that I would be able to pan it and bring Parker down a peg or two. I therefore reached eagerly for the copy that had been roosting unread on my shelf; but as I read, my spirits fell. For one thing, Parker has resisted the tendency of his prose to become turgid and polemical and the book's style is clear and straightforward. For another the book is informative and, for most of the way, uncontentious.

The book falls into three main sections. The first, taking up about half the text, is Parker's account of his own involvement with wildlife, starting with his entry into the Kenya Game Department in 1956, and covering his participation in the Tsavo anti-poaching operation and his early contacts with the Walian-gulu elephant hunters, his initiation of the Galana Game Management Scheme, the Uganda culling, the Tsavo controversy, the Rwanda elephant extermination, and his association with the ivory trade. This section establishes Parker's credentials as having been in on the ground floor of many of the key events of recent East African conservation history. It also documents his growing concern that much of the theory and practice of conservation in East Africa has been muddled, insincere and inappropriate. My only complaint about this section is that it is too short. I would have liked more of the anecdotal detail that, for me, made the account of the surreal 1973 Juba ivory auction the highpoint of the book.

The second section consists of a historical review of the ivory trade from pre-classical times to the present. Here Parker has distilled a mass of diffuse documentation and dovetailed it with his own detailed studies of the current trade to produce an intriguing and readable account. It is easy to forget that before Parker pioneered the study of the ivory trade in the 1970s, this

vital area was virtually a closed book to conservationists. Parker's object in this section (which includes two earlier chapters on the Wahiangulu elephant hunters), is to make the point that ivory has an aesthetic appeal to the human mind analogous to that of gold. This appeal has generated a complex web of activities, hunting, trading and crafting, spread over three continents since the dawn of history, most of which, when examined in detail, turn out to be skilled, artistic and admirable. The sympathetic approach to African hunters is one of the most significant aspects of the book. Parker does not ignore the dark side of the ivory trade, however, particularly its long and intimate association with the shave trade. Again, I was sorry that this section is so short and lacks a bibliography.

From the first two sections, Parker concludes that Africa's elephant population is still very large (probably over a million animals), that its range is very extensive and that a significant proportion of the population and range is protected in conservation areas. He argues that the African elephant is not endangered, that the present flow of ivory out of Africa does not exceed the sustainable yield and that the demands of the ivory trade are not the primary stimulus for killing elephants. He contends that elephants are at risk in conditions of political upheaval and breakdown of law and order, and more fundamentally, their numbers are progressively eroded as the expanding human population colonizes their range.

Parker now unmasks his batteries in the final short section of the book and proceeds to assault the conservation establishment, personified particularly by the kind of people who compile and read this *Newsletter,* IUCN/WWF, the specialist groups, the CITES administration and graduate zoologists in general. This is, of course, the part which has attracted most attention and controversy. He asserts that the conservation establishment has little knowledge or understanding of the interactions of wildlife and human populations in Africa; that its emphasis on poaching and the ivory trade as the primary threat is misplaced; that its insistence on the existence of a crisis in wildlife conservation in Africa is insincere and self-serving, and that its combination of ignorance, incompetence and dishonesty is damaging to the interests of conservation. As Parker says in the introduction: "I hope to show that there is no ivory crisis, but a very real crisis in conservation philosophy".

This is fighting talk; is it justified? While I would argue with certain aspects of Parker's case (a task that *Newsletter* readers will know is not to be undertaken lightly), I agree that the broad outline is sound and needs to be answered. I would contend, therefore, that *ivory Crisis* should be required reading for anyone seriously concerned with African conservation, that the conservation establishment should re-evaluate very carefully its role in the contemporary scene and that, specifically, we should re-examine our ideas about the use of wildlife resources by local people in and around conservation areas. Perhaps legalised "poaching" as envisaged in the original Galana Scheme concept will be the trend of the future. Perhaps it will be purist conservation, or a mixture of both. Parker's book raises many such questions which are basic to the future of conservation in Africa. Luckily, with a million elephants and nearly 4% of the sub-continent designated as protected area, we have a certain amount of leeway in which to find the solutions.

Rhino Exploitation: The Trade in Rhino Products in India, Indonesia Malaysia, Burma, Japan and South Korea by Esmond Bradley Martin. Preface by Lee Talbot. Introduction by Elspeth Huxley. (WWF, Hong Kong, 1983) $ 7.50

Many of those reading this review will be familiar with the thoroughness of Dr Bradley Martin's extensive research and reporting on the international trade in rhino products. This book is no exception, and its quantitative content is nicely leavened with a wealth of interesting information on traditional uses of rhino products.

Particularly intriguing is China's continuing role as a major recipient, but not consumer, of rhino horn. Arriving mostly as shavings originating from North Yemen, it is virtually all then incorporated into manufactured pills and potions and exported to trusting recipients in other Asian countries. The horn, being no longer'"recognizable" in this form, thus evades CITES regulations.

This book was conceived by WWF/IUCN for the dual purposes of raising money for WWF Hong Kong (the author receives no royalties), and more important, in the words of Elspeth Huxley in her introduction, to help "stir into vigorous action governments, societies, and individuals who really want to see the rhino preserved."

With these objectives in mind the author has, in the authoritativeness and readability of the text provided, done all that could be expected of him. The concern of this reviewer centres, firstly, on whether WWF could not have exploited Bradley Martin's work more effectively, and (be that as it may) secondly, on whether the present book is being used to full advantage.

It is clear that the book has great potential for fulfilling one of its own priority recommendations - namely to intensify publicity on the plight of rhinoceroses in Africa and Asia and its causes, in order to cut down demand for rhino products. In that Asia provides the main market for these, it is (as WWF intended) particularly appropriate that this book was published there, although Hong Kong was not, curiously, given a section of its own.

As it stands, the book has some other notable omissions. The set of recommendations for practical conservation action in each country covered mentioned in Lee Talbot's Preface are not to be found in the text, again reducing the book's effectiveness at the local level. While the author has evidently made vigorous and sometimes successful attempts to persuade pharmacists to promote substitutes for rhino horn, it appears from the lack of mention of the subject that neither he nor anyone else is yet armed with conclusive evidence that rhino horn is pharmacologically inert, whether as ferrifuge or aphrodisiac. Whatever happened to the WWF-sponsored research by Hoffman-LaRoche into this matter?

While local authorities will not appreciate the inaccurate implication made in the Introduction that Javan and Sumatran rhino conservation are lost causes, this well-researched and well-written book can still make a valuable contribution, and it is to be hoped that steps have been taken to ensure that WWF National Appeals and other suitable organisations are promoting its distribution in the six countries mentioned in the tithe, in addition to Hong Kong where we know it to be available. In particular, the book should also be distributed (free of charge?) to selected pharmaceutical traders to encourage more of them to promote substitutes for rhino horn amongst their clientele.

Robert Olivier Ecosystems Ltd

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