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Black Rhino Population Genetics for Conservation Management

by John Ledger

On 9 July 1987 a group of conservationists met at the University of Natal, Pietermaritzburg, to discuss the formulation of plans to safeguard the Black Rhino in South Africa. The conservation of small populations is made difficult by the steady loss of genetic variability that inevitably occurs with succeeding generations, unless new animals from other populations are introduced on a regular basis.

To introduce some up-to-date expertise on population genetics, the Endangered Wildlife Trust, the Hans Merensky Foundation (through the S.A. Nature Foundation) and the C.S.I.R. got together to bring Professor Michael E. Gilpin to South Africa for a series of workshops and meetings. He is currently Professor in the Department of Biology, University of California at San Diego. Professor Gilpin presented a most interesting and well-attended lecture to EWT members in Johannesburg on 28 July, using the California Condor (with only 27 birds remaining, all in captivity!) as an example of how small populations can best be managed to ensure the survival of the species.

The workshop was opened by Raoul du Toit, Executive Officer for the African Elephant and Rhino Specialist Group (AERSG) of the IUCN, who is based in Harare. He provided some updated estimates of Black Rhino populations in Africa, which make extremely depressing reading (Table 1). No information is available from Moçambique, Angola or Southern Sudan, but all three places are in a state of anarchy and Black Rhinos are undoubtedly down to low numbers; no reasonable guesses can be made as to how many. In 1980 there were probably 14-15 000 Black Rhinos in Africa - Raoul du Toit's estimate for 1987 is 3 733 animals only!

With reference to Table 1, there are many areas for which the 1982 populations are not accurately known, but Mr du Toit has reckoned that some of these have lost at least 70% of their 1982 numbers. In the case of the huge Selous Game Reserve in Tanzania, 90% of the Black Rhinos, a staggering 1 800 animals, have been poached in the last five years. The number of rhinos remaining is unknown, and until more information is obtained little hope can be held out for a viable population.

The position of the Black Rhino is extremely serious, and has reached crisis levels in Africa north of the Zambezi. The Zambezi valley itself is under an armed attack unprecedented in the history of nature conservation in Africa. In the last 5 years, no less than 200 Black Rhinos have been killed, while Zimbabwe government forces have killed almost 30 poachers, all of them Zambian nationals. The root cause of the problem, and the reason why poor rural Zambians will risk their own lives to kill Black Rhinos, is simple - **money**. Small money for the poacher, but certainly more than he can earn in a year, by selling his labour or growing crops or livestock - but Big Money for a group of businessmen operating in Zambia, with protection from prosecution, through a corrupt system. Read what Dr David Cumming, Chairman of the AERSG, recently had to say on the subject:

"Patronage of the corrupt businessman and the corrupt official by corrupt politicians can produce formidable triangular alliances which lead to illegal and devastating exploitation of natural resources. Just as such alliances have destroyed forests in India, so too are they responsible for the recent precipitous decline of black rhino in Africa. These corrupt alliances are undoubtedly a major driving force in the recent over-exploitation of elephant in many parts of Africa and too little attention has been paid to them. We have been too preoccupied with chasing poachers in the field and with changing fashions and trade in lands far removed from the primary area. The core of the problem is corrupt alliances which foster and promote the illegal and uncontrolled (uncontrollable?) exploitation of wildlife resources.

In tackling the rhino and elephant problem wildlife departments have emphasised prevention by going after the man doing the hunting in the field - the poacher. Traditionally, NGO's

John Ledger

On 27 August 1987 a group of six Black Rhinos arrived at Vaalbos National Park near Kimberley in the Northern Cape Province. They were all captured in the Etosha National Park in SWA/Namibia, and arrived in excellent shape after the long road journey. Here a young female in the holding boma gets her lips around some thorny Vaalbos Acacia twigs and crunches them with relish.

Quagga 19, 1987

Langebaan - A unique coastal area

NEWS RELEASE by Mr G J Kotzé, MP
Minister of Environment Affairs and of Water Affairs

The Langebaan National Park has just been substantially enlarged after the conclusion of an agreement between the National Parks Board and the Oude Post Syndicate (Pty) Ltd, in terms of which four properties of the Syndicate with a total area of almost 1 850 hectares, have been included in the park.

It is indeed a unique event since it is the first occasion where land in private ownership has been included in a national park by agreement between the National Parks Board and the owner, in terms of the provision made in the *National Parks Act*, 1976 in this regard in 1986. This occasion heralds a new era where national parks can be expanded substantially with the co-operation of private landowners.

From a conservation point of view, the Langebaan area was considered of such importance that it was accorded national conservation status. In December 1984 the area around the lagoon was proclaimed a nature area in terms of the *Physical Planning Act*, 1967. On 30 August 1985, the lagoon, admiralty reserve, other limited State property and the islands Marcus, Jutten, Malgas and Schapen were proclaimed as the first phase of the Langebaan National Park.

The inclusion of private land in national parks by agreement has considerable advantages for both the owner and the National Parks Board. The Board manages the land on a scientific basis and access to the land is strictly controlled while the property still remains in private ownership. The rights of the owner with regard, inter alia, to accommodation are, however, respected in so far as they are compatible with conservation practices and are provided for in the agreement. The Board provides the necessary staff and funds required for the effective management of the land. A further advantage is that conservation actions can be enhanced without necessarily having to acquire land for this purpose.

The era is, therefore, now being entered where the public and private sectors are joining forces to conserve our natural heritage.

Issued by the Ministry of Environment Affairs and of Water Affairs, Cape Town.

Roan Antelope for Natal

A herd of ten rare roan antelope will shortly be released in the Weenen Nature Reserve, said a spokesman for the Natal Parks Board.

Roan antelope, an endangered species, have, until recently, been extinct in Natal. The new herd will be captured in the Waterberg district of South West Africa by the Natal Parks Board's Game Capture team and trucked directly to Weenen Nature Reserve.

According to the Board's Director, Mr John Geddes Page, the herd will comprise four males and six females. "We want to build up a healthy breeding herd at Weenen," he said, "and once numbers are increasing we will restock other Natal Reserves with this valuable animal."

Restocking is only done in areas where the animal was known to have occurred historically or as a conservation measure to prevent the extinction of the species.

1987 ENDANGERED WILDLIFE TRUST CONSERVATION TROPHY

In the nearly ten years since the airforce base at Hoedspruit was proclaimed, continued successful conservation efforts have resulted in the base winning the EWT Conservation Trophy for the third time.

On 29 July 1987 the trophy was presented to Colonel C.B. Lombard, Commanding Officer at Hoedspruit Air Force Base, by Mr W.N. Breytenbach, Deputy Minister of Defence.

In his speech, Mr Breytenbach gave an assurance that the Defence Force would do whatever it could to promote conservation of wildlife. Full time conservation officers will be appointed in due course to achieve this aim.

The Hoedspruit base has had a measure of success with its efforts to overcome soil erosion, relocate species such as Tsessebe and to control the quantity and diversity of species within its reserve. Congratulations to all the servicemen involved with this noteworthy project - Hoedspruit Base is the pride of the SA Defence Force Nature Reserves.

Mr W.N. Breytenbach (left) presents the EWT Conservation Trophy to Colonel C.B. Lombard, Commanding Officer of Hoedspruit Air Force Base.

IN MEMORIAM

The Endangered Wildlife Trust has received with thanks donations in lieu of flowers from the following:

In memory of the late A.G. von Gunten:
First National Bank - Bramley Branch
R.A. Saunders
Thelma & Basil Petersen

In memory of the late Ivan Wesley Gouws:
Van Aardt Family
Parker-Nance Family
Pioneer Ford
Mrs H.J. Good
Mrs R.H. Gouws

In memory of Herbert Parker-Nance:
Payen Gaskets (Johannesburg)
Mrs H.J. Good
Mrs R.H. Gouws

In memory of Mrs Joan Smithyman:
C.R.C. Brownie
Smithyman Family Trust
Friends & Family - Mrs F. Takis, Swaziland
Mr J.N.C. Mundell

and aid organisations have similarly concentrated on supporting anti-poaching activities. The other main focus has been the illegal, and sometimes the legal, trade in ivory and horn. Trade bans have been imposed at national and international levels. Much effort and money has been expended on trying to change fashions and reduce demands amongst consumers in Asia or Europe.

International trade in rhino horn has been banned by all signatories to CITES since the inception of the Convention in 1976. Producer countries placed a moratorium on the sale of government stocks of horn although Zambia recently (1984) sold a substantial stockpile of horn to North Korea.

If the trend in black rhino in Africa is anything to go by (i.e. from 60 000 plus in 1970, to c. 12 000 in 1980 and then to less than 4 000 by the end of 1986) these measures have been a signal failure.

The pivot of illegal and uncontrolled exploitation is the mafia-like alliance which Vohra (1985) identifies, namely, the corrupt politician, the corrupt businessman and the corrupt bureaucrat. It is almost certainly at this pivotal node in the conduit from the field to the end consumer that the greatest profits are to be had, where motivation is highest, and where the ease with which hard currency can be placed in foreign bank accounts is a major part of the spoils. The individuals involved are, through political patronage, effectively above the law in their own countries and they do not infringe international laws of the sort that lead to arrest, detention and extradition. They are largely immune to the efforts of wildlife agencies - even where these are not involved in the corruption. That immunity is almost invincible when they establish cross-border poaching operations.

So what can be done? The first step is to identify the pivotal individuals. The next is to break the alliance, through whatever means are most appropriate, and so stem the strong local, sometimes regional, demand for horn and illegal ivory. These alliances and their demands do not respect national boundaries as Zimbabwe is discovering to its cost. For the most part these apparently simple steps are beyond the means and expertise of conservationists and wildlife department officials. They require the involvement of Heads of State and key professionals at a national and international level. We can merely identify the key problem." (from *Pachyderm* No 7: 1986)

In Zambia itself the Black Rhino is in a desperate situation. In Luangwa

Table 1 Basic demographic data of Black Rhino populations of 20 animals or more *(Source: Raoul du Toit, AERSG, July 1987, based on AERSG meeting in Kenya, May 1987).*

Population	Area, km²	Population 1987	Population 1982
Zambezi	13 000	750	1 000
Sebungwe	5 000	650	?
Etosha	22 270	350	275
Hwangwe/Matetsi	18 400	300	?
Hluhluwe/Umfolozi	900	220	?
Selous	55 000	200	2 000
Tsavo	20 200	150	300
Kruger	19 485	140	70
Kaokoveld	70 000	90	50
Solio	62	75	?
GonareZhou	5 000	75	100
Luangwa	16 600	75	?
Mkuzi	251	70	?
Aberdares	700	60	132
Laikipia	350	47	
Ndumu	100	42	
Nairobi	120	40	
Mt. Kenya	700	40	
Itala	297	35	
Cameroon/Chad	5 000	30	100
Pilanesberg	500	27	19
Ngorongoro		25	50
Rubondo	460	25	
Kasungu	2 300	20	30
Kafue	22 400	20	?
+ 13 areas with less than 20 animals each		137	
		3 733	

Peter Joffe

EWT Director John Ledger presents a cheque for R5 000 to Mr Dirk Ackerman, Head of Inland Parks of the National Parks Board, while Chief Research Officer Dr Anthony Hall-Martin looks on. The donation was made towards the costs of translocating Black Rhinos from Etosha to Vaalbos National Park.

the numbers are down to 75 animals from an estimated 150 in 1986, and this in spite of the strenuous efforts of the Save the Rhino Trust, a non-government organisation set up to raise funds to bolster the ineffectual efforts of the government game department. The SRT patrols now cover only a small part of Luangwa, and it looks as if another "lost cause" is about to go down in history.

Lucy Vigne and Esmond Bradley Martin (*Quagga* 15, 1986, pp. 11-12) have told EWT members of how Kenya is trying to save its rhinos - by putting them behind electric fences! Over the next four years, over one million pounds sterling will have to be raised to put electric fences around four rhino sanctuaries in four national parks: Nakuru, Nairobi, Aberdares and Tsavo West. The first one, requiring 74 km of electric fence to enclose 140 km² of land beside Lake Nakuru and to protect maybe 30 Black Rhino, is now being developed at a cost of 225 000 pounds sterling. Here is a further step towards a state of total siege. Electric fences to keep people away from rhinos!

In the Pilanesberg National Park in Bophuthatswana there is an electric fence around the tented camp at Mankwe - it is to keep the rhinos away from the people! The Black Rhino in Pilanesberg is increasing in numbers, and given the excellent record of park management so far, there is every reason to expect that the estimated carrying capacity (ECC) of 120 animals could be achieved. In the Kruger National Park the population of Black Rhinos is increasing rapidly, and the ECC is 3 500 animals, a huge potential that could guarantee the survival of this species, if it can be attained. The Zululand reserves of Ndumu, Mkuzi, Hluhluwe and Umfolozi (but excluding the Eastern shores) have reached their ECCs, and animals have been translocated to form new nuclei in other parts of Natal, the Eastern Cape, Pilanesberg and Kruger National Park.

So far we have been talking about the southern-central Black Rhino group, also known as *Diceros bicornis minor*. The other three groupings are the south-western (SWA/Namibia, *D.b.bicornis*), north-eastern (Kenya & N. Tanzania, *D. b. michaeli*) and the northern-western (Cameroun ' Central African Republic, *D. b. longipes*).

A small population of 17 *D. b. michaeli* lives in the Addo Elephant National Park, and should increase in due course to the ECC of 30 animals.

John Ledger

Dr Michael Gilpin (left), Richard Emslie and Peter Goodman (Natal Parks Board)

Over in South West Africa/Namibia the Etosha population of *D. b. bicornis* at 350 animals is up by some 75 in the last five years, and has provided translocated animals for re-introduction to Augrabies National Park in 1985 (5 animals) and to Vaalbos National Park in 1987 (6 animals). In the huge area of the Kaokoveld, the Black Rhino, mainly in Damaraland, is up to an estimated 90 animals from only around 50 in 1982.

Reference to Table 1 shows clearly that only in parts of southern Africa is the Black Rhino increasing in numbers. Does this mean that only in southern Africa are found dedicated, loyal and disciplined rangers and park wardens; properly trained conservation scientists; government employees and officials that are honest; non-government enthusiasts backing official conservation efforts; men of integrity who are determined that the Black Rhino will not become extinct in the areas under their custodianship? You answer that question for yourself!

But lest anyone starts getting complacent, look at what is happening in Zimbabwe, which has one of the continent's best and most committed Departments of Wildlife and National Parks. It is the stronghold of the Black Rhino, with over 1 700 animals (45,5% of the total population), and is having to go onto virtually a war footing to meet the onslaught of the poachers from the north. Things are now being made increasingly difficult for the poachers in the Zambesi valley, and Dr Cumming sent a warning with Mr du Toit to Pietermaritzburg - conservationists in South Africa and South West Africa/Namibia beware, pressure will soon be on your rhinos!

The other exercise carried out by Mr Raoul du Toit was to rank the different Black Rhino populations in an order of importance, which included an allowance for the estimated loss through poaching to which each group would be subjected. Etosha, Umfolozi/Hluhluwe, Kruger, Kaokoveld and Mkuzi were all in the "top ten" of this list.

The American Association of Zoological Parks and Aquariums (AAZPA) held an African Rhino Workshop in Cincinnati, Ohio from 25-28 October 1986. Approximately 100 persons participated in the Workshop representing field conservationists, zoo professionals, academic researchers, and support organisations from Africa, North America, and Europe. The chairman and many members of the AERSG and CBSG (Captive Breeding Specialist Group) were in attendance. Here are some extracts from their subsequent summary and recommendations:

A crisis is occurring for survival of rhinos in Africa. Numbers of black rhino in Africa have been reduced, largely by poaching, from an estimated 60 000 in 1970 to less than 4 000. Moreover, the remaining animals are increasingly distributed in small and fragmented populations whose survival may be endangered by genetic and demographic problems even if they can be protected from poachers. About 150 black rhinos are maintained in the zoos of the world. Almost all of these animals derive from the East African populations.

John Ledger

Dr Jeremy Anderson (left) and Peter Hitchins, both from KaNgwane.

GENERAL RECOMMENDATIONS

1. The Workshop emphasizes that continued poaching for the illegal trade in rhino horn is the greatest threat to the ultimate objective of survival of African rhinos in the wild, both as species and as components of their ecosystems. Therefore, the Workshop most strongly encourages continued and intensified anti-poaching measures as delineated efforts to reduce and eventually eliminate the trade in rhino horn which motivates the poaching in Africa. In particular, the Workshop urges the Organization of African Unity (OAU) and its member nations to apply pressure on those African countries harbouring culprits to implement all measures necessary to eliminate poaching and illegal trade in rhino horn and other products as provided in the OAU conventions.
2. To faciliate the *ex situ* programs for African rhino, the Workshop observes the great need for annual updates of the International studbook for both black and white rhinos. Moreover, the Workshop suggests that there be consideration of using studbook techniques for intensive *in situ* management of rhino in Africa. The zoo community is able and willing to help African nations technically and financially with this endeavour.
3. The Workshop believes there is a need to improve the clinical and pathological investigations of both black and white rhino in captivity and where practical in the wild.
4. The Workshop strongly recommends that research be conducted on enhancement of reproduction in rhino to provide techniques for transfer of genetic material which can be used for management of captive and wild populations to assist in their conservation and survival.
5. The Workshop recognizes the great value of PACHYDERM, the Newsletter of the AERSG, as a primary reference on conservation issues and priorities for individuals, institutions, and organizations desiring to contribute to conservation of African rhinos. The Workshop encourages wider distribution of PACHYDERM, especially to *ex situ* facilities and fundraising organizations, and endorses the idea of including in each issue of PACHYDERM a status update with tables and maps of the most recent reports and estimates of numbers of rhinos in Africa. It would be useful to have in each issue a list of the prioritized projects of the AERSG, along with their costs, as an aid to fundraising efforts and coordination.

BLACK RHINO RECOMMENDATIONS

1. The Workshop strongly endorses the draft continental strategy for black rhino in Africa formulated by the AERSG.
2. The Workshop reaffirms that the 3 major components of the conservation strategy for black rhino consist of:
   a) Protection of the larger (<100 animals) populations in the wild.
   b) Intensive *in situ* management of smaller (<100 animals) populations in the wild.
   c) *Ex situ* programs, specifically captive propagation, to reinforce survival of wild populations.
3. As an interim strategy, until more is known about the genetic and ecological differences within the species, the Workshop recommends that the intensive *in situ* and the *ex situ* programs recognize 4 conservation units within the black rhino range:
   a) The southwestern population in Namibia.
   b) The southern-central populations extending from Natal through Zimbabwe and Zambia into southern Tanzania.
   c) The eastern populations in Kenya and northern Tanzania.
   d) The northern-western populations extending from the horn of Africa to Central African Republic and Cameroun.

   Ex situ and intensive *in situ* programs should not mix animals from these 4 conservation units at this time.
4. Appropriate studies of evolutionarily significant differences, including both genetic diversity and ecological adaptations, are greatly needed for management decisions with both the wild and the captive populations. The Workshop strongly recommends that such studies be conducted as soon as possible and be coordinated through the AERSG.
5. For the long-term conservation of the species, the Workshop strongly supports continuation and extension of the analysis of demographic and genetic problems for the species in the wild through population modelling and decision analysis. The appropriate experts from the captive and wild communities should collaborate on these studies. African governments are encouraged to cooperate with these studies.
6. Considering principles of conservation biology, the Workshop acknowledges that a minimum, long-term objective for each of the recognized conservation units in the wild is a total population whose genetically effective size is 500. Since the genetically effective size is usually much lower than the census number, a minimum total population of 2 000 per conservation unit may be required to achieve the ob-

jective of a genetically effective size of 500.

Since 4 conservation units are being recognized, these considerations recommend a minimum viable population (MVP) of at least 8 000 rhinos in Africa as an optimal long-term objective. The Workshop also realizes that it is unlikely that a contiguous population of 2 000 within any conservation unit will be possible in the foreseeable future. However, by interactive management of the several disjunct populations that will likely characterize each conservation unit, the overall objectives of these combined populations can be achieved.

The Workshop observes that the total estimated population of black rhino in Africa is less than half the total recommended minimum number of 8 000 and that only the southern-central populations are near the 2 000 MVP recommended for each conservation unit.

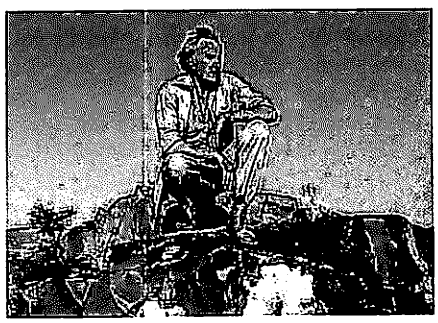
7. Since the conservation units being recognized will extend across political boundaries, there will be a need for regional cooperation within

THE DAVID SHEPHERD PROJECT

David Shepherd, world-renowned wildlife artist who has personally raised more than one million pounds for conservation projects around the globe, visited Damaraland in August this year. The area is the home of the desert elephants and rhinos, and the Black Rhinoceros population here is increasing steadily, thanks to the dedicated efforts of both government and non-government conservation agencies. Of the latter, the auxiliary game scout programme and the work of Garth Owen-Smith and Blythe Loutit are supported by the Endangered Wildlife Trust. All played a significant role in saving the rhinos from extinction during the orgy of poaching that took place in the 1970s, and continue to protect the desert creatures against unscrupulous men.

David Shepherd has generously agreed to help raise further funds for the protection of the Kaokoveld and its unique array of wildlife. He will donate an original painting, inspired by his visit in August, of which a limited, numbered and signed print will be produced and offered for sale around mid-year in 1988. One lucky purchaser of the print series will win the original Shepherd painting - probably worth at least R25 000 at current world prices!

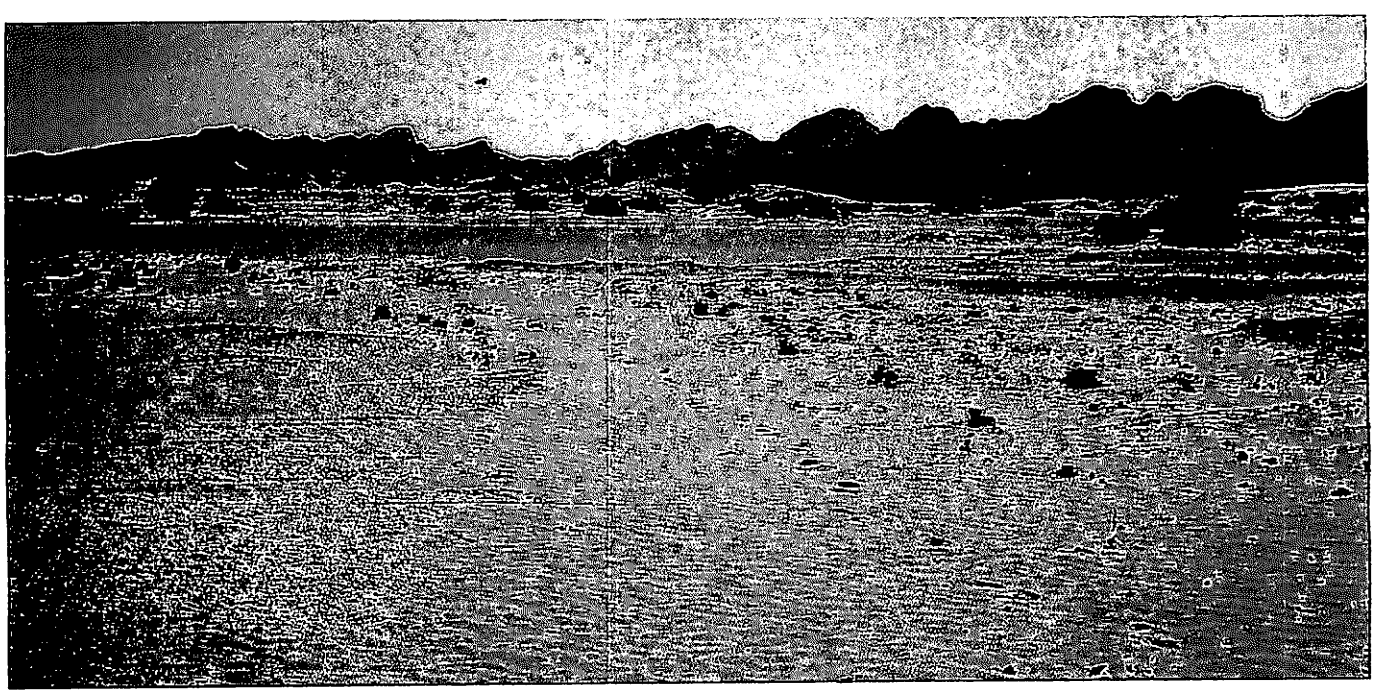
David Shepherd will return to South Africa in October or November 1988, to open a retrospective exhibition of his paintings, and to follow up his Kaokoveld fundraising promotion. The Endangered Wildlife Trust will be celebrating its 15th Anniversary at the same time, with a symposium of great significance to wildlife conservation in the subcontinent. Further details about the symposium and David Shepherd's fantastic Kaokoveld print will appear in forthcoming issues of *Quagga*. By the way, there will probably be a huge demand for the Shepherd print, so if you would like to reserve one in advance (and we can't give you more than an *estimate* of the cost at present), please telephone our office and leave your name and address so we can put you on our list.



John Ledger

David Shepherd.

David Shepherd's visit to the Kaokoveld was sponsored by the Endangered Wildlife Trust, the Everard Read Gallery, Lagamed (Pty) Ltd and the Rhino and Elephant Foundation. Funds raised by the print appeal will be shared equally between the Endangered Wildlife Trust and the Rhino and Elephant Foundation, and both organisations have pledged that these funds will be fully committed to conservation projects in Damaraland and Kaokoland.



John Ledger

Upper Hoanib valley, looking north into Kaokoland.