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The recovery of the southern white rhino from a low perhaps 50 to 200 earlier this century to today's number of approximately 6 000 in the world is truly one of the success stories of African wildlife conservation. But poaching is beginning to erode that progress. Two reintroductions on Mozambique and one in the Central African Republic have been extirpated by poachers. Populations in Botswana, Zambia and Zaire hang in the balance, and healthy populations in Namibia and Zimbabwe are now drawing poacher fire.

The black rhino is following close on the

led to the dramatic decline in African rhinos are numerous and varied, but tradition, money, and political instability all played a part. Most horn sold today is used for medicinal purposes in the Far East, a tradition dating back at least 2 000 years. Recent studies by members of TRAFFIC International, a WWF and IUCN programme that investigates trade in wildlife products, have shed some light on the extent of the traditional medical market today (Nowell, Chyi and Pei 1992). These researchers found that 5 660 licensed pharmacies in Taiwan carried rhino horn products, and estimated that some 8 000 unlicensed shops also dealt in such medicines, bringing the total to over 13 000 retailers. Given these statistics from just one of the four major

# HORNS TODAY, GONE TOMORROW

## IS DEHORNING A REALISTIC OPTION?

heels of the white rhino in its plunge towards extinction. Fragmentation and isolation of remaining populations of black rhino make them extremely vulnerable to poaching, and raise questions about long-term maintenance of genetic diversity. Demographic problems no doubt overshadow genetic concerns at this time, and numbers have continued to dwindle from 14 700 to less than 3 000 in the last decade. Recent dehorning work in the Zambezi Valley, one of the last strongholds for black rhino, has revealed that the numbers remaining there are closer to 500 than to the previous estimate of 1 500.

Everyone agrees that this trend must be halted immediately, but just how to accomplish this goal is another issue. The factors that have

consumers of rhino horn (China, South Korea, Taiwan and Thailand), efforts to stop the already illegal trade before many more wild populations are destroyed seem unlikely to succeed.

Looking at the supply side of the problem, political unrest, corruption, poverty, and lack of funds in many African nations to outfit and run anti-poaching teams stack the odds in favour of poachers and the middlemen who organise the illegal trade. Minimum annual costs to conserve rhino in the wild have been estimated at US \$200-400 per square kilometre in the thick bush of Zambia and Zimbabwe where poaching pressure is high (Leader-Williams and Albon 1988, Martin 1991). Protection of wildlife is only one of the issues competing for limited national

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within a fenced area. As yet dehorning is not officially obligatory, but the wildlife manager who declines to have rhino dehorned faces a heavy moral responsibility if any rhino are subsequently poached. It seems to be a no-win situation.

The management on Iwaba takes great pride in the fact that the estate is a self-sustaining, viable wildlife enterprise. All income is derived from various forms of wildlife utilisation – there is no external source of funding. The profits from one form of utilisation provides the support for other wildlife projects, such as the care of endangered species like the rhino. However, as the rhino on Iwaba continue to multiply and the threat of poaching increases (a rhino was poached on a neighbouring ranch last December), it has become necessary to step up the number of anti-poaching patrols considerably.

Unable to afford this increased level of protection, Iwaba has been obliged to accept external assistance. We have been fortunate in obtaining the support of the Harare Sheraton Hotel which has agreed to pay the wages of six game rangers from money raised through its "Environmental Dollar" scheme. In the past Iwaba has maintained a low profile because of the presence of its rhino population, but this may change a little with the support of such a well-known organisation.

Both species of rhino are now breeding successfully and it is hoped that, in time, Iwaba's black and white rhinos will be able to make their contribution to the regeneration of Africa's depleted rhino population.

*Photo: Justin Seymour-Smith*





funds, meaning that the fate of rhino might, out of necessity, depend on the long-term investment of international funds.

One thing is certain: conservation steps taken to halt the slaughter of African rhino, including a total ban on trade and military-style anti-poaching have not been successful in protecting the beasts in much of southern Africa. Alternative strategies are being

discussed for over fifteen years, comically by some. It was not until 1989 that wild rhino were dehorned. At that time, the Namibian Directorate of Nature Conservation began a horn removal programme on a population of desert-dwelling black rhino in the Kaokoveld region, part of what is now called the Kunene Province. More black rhino were dehorned in 1991 in this hyperarid region in the northern



*Poached white rhino in Hwange, and anti-poaching scouts.*

employed including translocation to private, protected lands and relocation to captive breeding centres overseas. Recently, horn removal from free-ranging rhino has been implemented to buy some time for rapidly declining populations.

#### **Horn removal**

Horn removal from live animals has been

Namib. Zimbabwe followed suit in 1991 with a pilot dehorning operation on white rhino in Hwange National Park. Continued high levels of poaching, particularly of black rhino in the Zambezi Valley, prompted an expansion of the dehorning programme, and in 1992, national policy decreed that all vulnerable populations on state lands in Zimbabwe be dehorned.

During the pilot operation in Hwange in



1991, a total of 71 white rhino were immobilised, and of these, 59 adults and subadults were dehorned. An additional 13 animals were dehorned in Hwange in 1992, along with 69 black rhino. The immobilisation and horn removal work was under the direction of Dr Mike Kock, wildlife veterinarian for the Zimbabwe Department of National Parks and Wildlife Management, assisted by Drs Mark Atkinson, Chris Foggin and Peter Morkel. An

aircraft was used to locate animals for dehorning in Hwange, but tracking on foot proved more efficient in some terrain, and especially in finding black rhino.

Rhino were darted from a helicopter, and once the animal was down, the dehorning team worked quickly. Young rhino were immobilised with their mothers to avoid stressing the calves (and ourselves)! A chainsaw was used to cut the horns and trim the bases,



Photo: Courtesy of Mike Kock

*Land Rover showing REF modification during dehorning operations.*

#### **REF FUNDING FOR MODIFICATIONS**

The Rhino & Elephant Foundation funded the modifications to two Land Rover Defender 110 2,5L turbocharged pick ups, used by Dr Mike Kock and Dr Mark Atkinson in the Wildlife Veterinary Unit within Zimbabwe's Department of National Parks and Wildlife Management. The modifications made these vehicles, essential for field work with black and white rhino and other veterinary related tasks, suitable for the rough terrain this unit operates in.

On the rhino front, a total of six dehorned white rhino (since May 1991) and ten dehorned black rhino (since May 1992) have been lost in Zimbabwe. Comparing this to official statistics of 52 horned animals killed between September 1991 and January 1992, it is firmly believed that a dehorned rhino has a greater chance of survival than one with a horn. Dehorning is a viable option but *only* if it is supported by other measures.



which were then treated with Stockholm tar to protect and seal the cut surfaces. During the 15-25 minutes that the rhino were recumbent, we also recorded horn and body measurements, collected blood and tissue samples, marked animals for long-term identification with ear tags and ear notches, and monitored vital signs. Once a reversal drug was administered, the rhino were usually standing within two minutes. As each rhino trotted off into the bush, we hoped that at least some would be safer, albeit a little less noble looking.

Dehorning as a conservation strategy has been controversial. It could, perhaps, be effective as a short-term solution to protect dwindling populations facing chronic poaching, but the cost of dehorning in relation to rates of horn regrowth, its effect on illegal activity, and possible effects on the animals themselves must be examined. Studies were begun in both Namibia and Zimbabwe in 1991 to help address some of these questions. The research is ongoing, but some information is beginning to emerge.

### **Poaching and dehorning**

Poaching regimes differ between the Namibian and Zimbabwean study sites. Poaching dropped off in the Kaokoveld following the dehorning of Namibia's desert rhino, but this trend also occurred throughout the country, and probably was strongly influenced by concurrent social and political changes that accompanied independence in 1990. There has been no poaching since 1989 in the Kunene Province, although black and white rhinos are still being killed in other areas of Namibia. The end of aggression between Namibia, Angola and South Africa, as well as the continuing development of an auxiliary game guard system (Owen-Smith 1986, Owen-Smith and Jacobsohn 1989) presumably contributed to the near cessation of rhino poaching in Namibia. The game guard system, begun by Garth Owen-Smith in 1982 and continued during the

late 1980s and early 1990s by Save The Rhino Trust, is non-militaristic, aiming to involve the rural community in an effort to encourage protection of natural resources. Government conservation officers assist in this work and financial support is given to local trackers for patrolling rural areas, searching for signs of poaching incursions. The goal is to discourage poachers from entering these areas.

In Zimbabwe, however, poaching both in Hwange National Park and in the Zambezi Valley has continued. Certainly one of the most pressing questions is whether or not dehorning lowers the risk of rhino being poached. For this conservation strategy to be most effective, it must be well known that rhino in an area are hornless. Educational materials advertising this fact are being distributed by the Department of National Parks and the Zimbabwe Wildlife Society in local languages in Zimbabwe and Zambia. Although four dehorned rhino and one calf have been poached in Hwange Park since 1991, there have been some encouraging events.

In two incursions there is evidence that poachers followed but did not shoot additional rhino after killing two dehorned animals; in one incursion poachers wounded but did not pursue two rhino after taking horn bases from a dehorned individual. In both cases, poachers gave up hunting after discovering how little horn remained on their quarry. Number of rhino killed per incursion in the Main Camp region (where 94 percent of Hwange's white rhino are located) has dropped from an average of 2.0 in 1990 to 0.5 in 1992. These data are not enough to assess the effectiveness of this programme in deterring poaching, but suggest that poaching risk may be lowered for hornless individuals.

A different, but related, question is whether or not poachers select rhino with larger or longer horns. Berger and Cunningham assessed this possibility by looking at 104 horns confiscated from poachers and comparing horn sizes



with those in wild populations. If poachers do select larger rhino, one would expect to find larger horns in the confiscated stock than among living populations. Another symptom of poachers selecting large horns would be that rhino living in areas with poaching would tend to have smaller horns than those in protected regions. This is not the case for black rhino in Namibia, where horn sizes do not differ between areas with and without poaching, or between the horns of live rhino versus confiscated horns. These data raise the possibility that poachers might continue to hunt even dehorned animals. Although poachers apparently shoot any rhino they encounter while hunting, this does not mean that horn removal will be ineffective, for the real purpose is to discourage poachers from even entering an area to hunt rhino. We'll be monitoring poaching activity, rhino survival and level of anti-poaching efforts in Hwange and throughout Zimbabwe in order to gain a better understanding of the issue.

#### **Horn regrowth**

Horn regrowth is being measured using a photogrammetric device mounted on a 300 mm

camera lens. This device acts like an extremely accurate range-finder, permitting measures of horn and body sizes to be calculated from photographs of the rhino. Additionally, we examined regrowth of several white rhino that were re-immobilised one year after horn removal. Rates of horn regrowth were assessed from 80 percent of the dehorned black rhino in Namibia. Regrowth did not differ between males and females, but young black rhino grew their new horns faster than did adults; total regrowth of front and back horns together was 13.3 centimetres per year for juveniles and 8.7 cm/yr for adults. Although regrowth rates in white rhino were similar for the sexes, the anterior horns regrow faster (6.7 cm/yr) than the posterior ones (2.9 cm/yr); total length of horn produced by adults averaged 9.6 cm/yr. Rates of regrowth from dehorned animals of both species exceed the values of intrinsic (actual) growth for anterior horns determined by Pienaar and Hall-Martin (1991), and it is possible that dehorning might stimulate slightly faster growth than that of intact horns.

We converted horn size data and regrowth rates into estimates of horn mass so that market values for newly grown horns could be estimat-

#### **HOW TO DEHORN?**

Joel Berger of the University of Nevada in Reno (USA) recently published a note on rhino conservation tactics in the journal *NATURE* (vol 361, Jan 1993).

Here he indicates that dehorning costs about US \$1.400 per animal. Compare this with the estimated horn value of \$1 300 – 1 700 after one year's regrowth, and it becomes clear that horn harvesting must be intensive if rhinos are to remain valueless to poachers.

He also remarks on the considerable and often sensational media coverage of dehorning, suggesting that this in itself may have the effect of causing poachers to concentrate elsewhere until all the interest has died down.

Further, as regards a possible negative effect of dehorning in making rhino mothers less able to defend calves, he cites unpublished data he and Carol Cunningham have gathered, showing that whether mothers flee from predators like lion and spotted hyaena has more to do with the age of the young than with horn size. Mothers with calves less than 18 months old flee about five times more often than when calves are older.

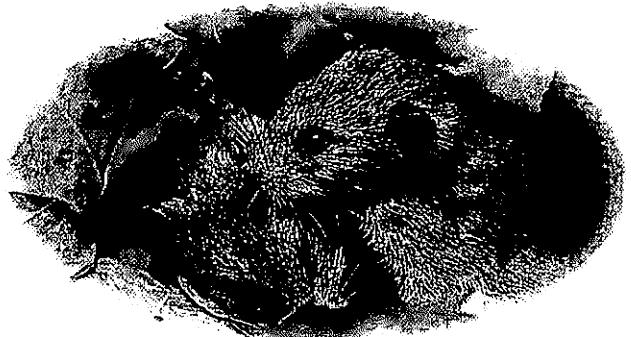
# SOME OF THE



# MEMBERS OF OUR



# REHABILITATION



# PROGRAMME

Richards Bay Minerals has been extracting valuable minerals from sand for 15 years and has been practising integrated environmental management from the outset. We were the first South African company to employ a full time ecologist. The land we've mined will over time be returned to the same, and in some areas, a better state, than it was before mining. In recognition of our advanced environmental programme, we were given the

EPPIC award. The findings of several scientific studies conducted on the rehabilitated dunes show that the vital steps of plant, animal and insect succession are taking place, proving the ecological success of this pioneering work. On this page are just a few of the creatures that live on rehabilitated sand dunes and illustrates our concern for creating a balance between economic development and care of the environment.





*Mike Kock dehorning a white rhino.*



ed. Regrown horn mass for black rhino averaged 0.54 kilograms per year for adults and 0.33 kg/yr for juveniles (which have smaller horn bases). Because male white rhino have much larger horn bases than females average mass of horn produced annually differed significantly between the sexes, being 0.56 kg and 0.45 kg for males and females, respectively. Hence, with the lowest wholesale price for African rhino horn in Taiwan at US \$3 075 per kilogram (Nowell, Chyi and Pei 1992), the mini-

mum market value of horn produced annually would be \$1 661 for black rhino adults, and \$1 722 and \$1 384 for adult white rhino males and females. Because some horn remains at the base following dehorning, the reward available to the poachers would be approximately twice these values one year after horn removal.

### **Conservation options**

As with elephants, management decisions for rhino conservation will need to consider local

### **REF LOANS NIGHT SCOPE**

Janet Rachlow has been making observations of dehorned white rhino with night-vision equipment provided by the Rhino & Elephant Foundation. Before the first horn removal operations began, she was locating white rhino concentrations and collecting identification photos when the need for such equipment became clear:

"One night, I was atop the Land Rover with a National Parks scout at a small, natural waterhole waiting for rhino to appear. We waited in vain into the early hours, and finally called it quits only to discover rhino spoor at the water's edge in the morning. Resolved not to make the same mistake twice, we planned to stay up the entire next night. We were rewarded around midnight as two hulking forms emerged from the bush and splashed into the water.

"As we approached to within 30 metres (the maximum distance of our camera flash), something didn't seem quite right; all that was visible in the moonless darkness was a hint of shadow against the water and four gleaming horns. We set off the flash to discover the angry eyes of two big, old buffalo bulls."

Hwange has an estimated 34 000 elephants, and rhino observers have also learned that these giants can approach a waterhole or Land Rover utterly quietly. The night-vision device on loan from REF not only makes the work safer, but also more efficient. "We are able to observe territorial behaviours of rhino males, such as urination marking and kicking at dung heaps, as well as social interactions among rhino and between rhino, predator and elephant," says Janet.

And in October of 1992 she had an encounter that really made her appreciate the night-vision equipment: "I was sitting at a waterhole alone (my scout had been tracking rhino all day for the dehorning operation, and I couldn't ask him to sit up half the night as well). A female white rhino and her young calf had left the water and were slowly making their way through the tall grass towards the thicker bush. As I watched them leave using the night-vision device, I noticed four figures heading towards them.

"At about 300 metres, I was unable to determine what species these were, but soon began to realise that there was a reason why their silhouettes looked odd. I jumped in the vehicle, and drove towards them to about 200 metres and confirmed my fears; the figures of four people, obviously startled by the engine and headlights, were running off into the bush. That night left me wondering if, without the night-vision equipment, I would have been alerted to the poachers' presence by gunfire."



population numbers, poaching pressures, and funds and personnel available to protect the animals. Given the dire status of all rhino species today, managers will need as many options as possible, along with an understanding of their implications. Dehorning as a conservation strategy is intended to buy some time for otherwise doomed wild populations; horn removal should be considered one tool available to managers. Longer term considera-

the Rhino Survival Campaign have funded the Zimbabwean study. The Namibian programme has been supported by the American Philosophical Society, Hasselblad Foundation, National Geographic Society, National Science Foundation, Rhino Rescue Ltd, Save the Rhino Trust and Wildlife Conservation International. The University of Nevada, USA and the World Wide Fund for Nature have contributed to both studies.



photo: Janet Rachlow

Dehorned white rhino 1 year after dehorning.

tion of a legal trade in rhino horn (see *REF Journal*, Vol 5, 1991) and the possibility of harvesting horn from captive animals are separate, but related issues. Conservation of free-ranging populations of rhino poses an enormous challenge, and one which will require all means at hand.

#### Acknowledgements

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