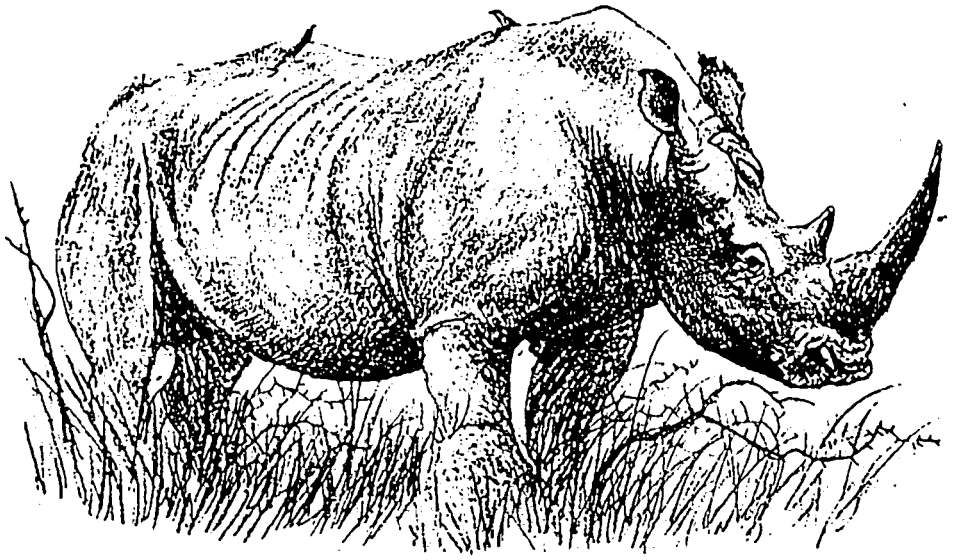
THE STATUS OF THE RHINOCEROS IN AFRICA



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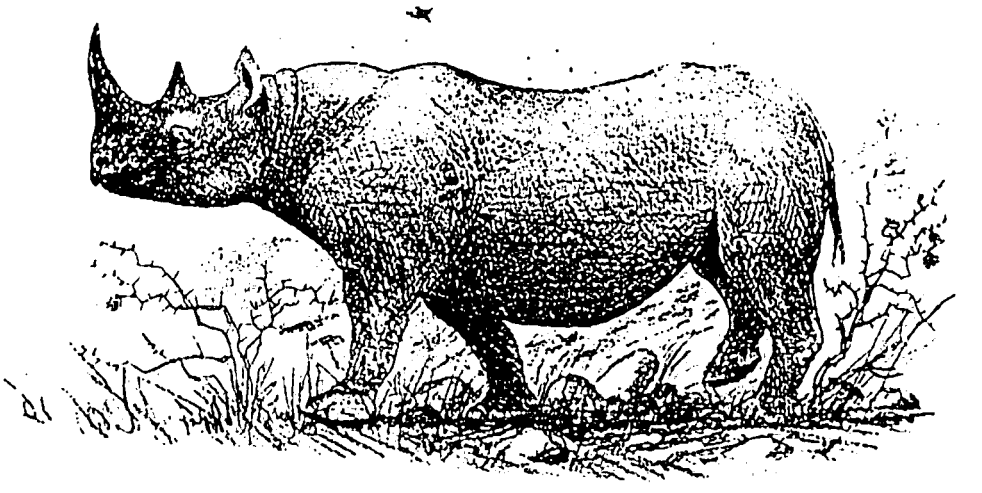

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CONTENTS

INTRODUCTION

"The survival of Africa's rhino and elephant population is so vital that it transcends political and geographic boundaries. Mankind's survival depends on his respect for the environment and its denizens. Without these splendid creatures which are so closely interwoven into our historical and cultural backgrounds, Africa and the world would be the losers. It is horrifying and a very sad indictment on man that even in this enlightened age, with all its technological advances, his wisdom cannot be used to conserve the remnants of once vast herds". Inkosi M G Buthelezi, President of the Rhino and Elephant Foundation at the opening of the Rhino Conservation Workshop, Skukuza, Kruger National Park, 1988.

The concern for the survival of African rhinos is very real, based on the fact that since the 1970's black rhino populations have declined at an alarming rate. Black rhino numbers declined 99% in Kenya, 93% in Tanzania, 96% in Zambia and the black rhino has become extinct in Somalia, Ethiopia, Chad, Uganda and Mozambique. In the Central African Republic, Sudan, and Angola, the black rhino are on the verge of extinction. Between 1986 - 1988 alone black rhino populations in Africa declined by 50%. (Hall-Martin, 1988; Chilvers, 1990).

As regards white rhino, although considered one of the conservation success stories of the century, the northern subspecies is on the verge of extinction with only 17 animals occurring in the Gambara National Park, Zaire in 1988 and a further 13 in Zoological gardens (of which only 1 female is breeding). The southern subspecies is currently increasing with large populations occurring in Natal, from which smaller populations have been established in other parts of the Southern African subregion. It would however be dangerous to become complacent as regards the status of the southern subspecies of white rhino as poaching is extending into the southern regions. Mozambique already holds the dubious distinction of having its white rhino populations go extinct twice (Montgomery, 1989; Skinner and Smithers, 1990).

At The Rhino Conservation Workshop, Skukuza, Kruger National Park, in 1988, the following topics were thought to be most directly relevant to Rhino Conservation in Africa: (Anon., 1988)

1. Poaching of rhino and illegal trade in rhino horn.

2. Assuring the future of rhino (more urgently the black rhino) in Africa through appropriate management strategies.

3. Capture, translocation and monitoring of rhino populations in Africa.

This seminar reviews the reasons behind the dramatic decline in rhino numbers in Africa as well as examining strategies currently being applied and potentially effective strategies for the future conservation of these animals.

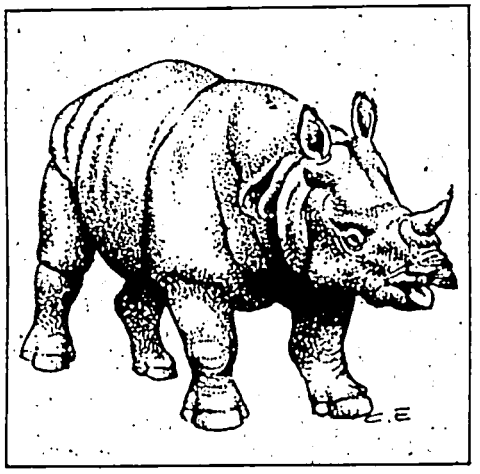
2. EVOLUTIONARY HISTORY OF THE RHINOCEROTIDAE (ORDER PERISSODACTYLA)

Owen-Smith (1988) suggests a possible precursor of the Rhinocerotidae (order Perissodactyla) to be the genus Hyrachyus which was found in late Eocene deposits in North America and Asia. Genus Hyrachyus were small, light bodied animals very similar to horses and tapirs. Descendants of this genus soon exhibited a tendency towards large body size and the development of boneless horns characteristic of modern Rhinocerotidae. Five living species of rhinoceros occur and these fall into three distinct subfamilies, all having had independent evolutionary history from at least the Miocene (23 - 19 million years ago) (Refer table 1 and Figure 1) (Owen-Smith, 1988; Skinner and Smithers, 1990).

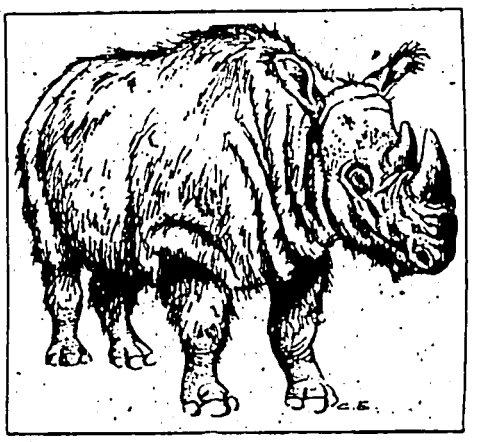
The Asian one horned rhinos belong to the subfamily Rhinocerotinae and are characterised by the single nasal horn and by the retention of lower incisors which are modified into short tusks for use in fighting (Owen-Smith, 1988). Two species of Rhinocerotinae occur today - the more primitive Javan rhino and the Indian rhino (Anon., 1992b). The second subfamily, Dicerorhinae (or Asian two-horned rhino) has only one extant species - The Sumatran rhino (Owen-Smith, 1988). The Sumatran rhino is the smallest of all existing species, and has evolved relatively unchanged from its Oligocene ancestors, retaining a fairly hairy coat as well as hairy tufts around the ears (Anon., 1992b). The African rhinos or subfamily Dicerinae can be distinguished from subfamily Dicerorhinae by their lack of ossification of the nasal septum. Both extant species lack incisor and canine teeth. The modern black rhino (Diceros bicornis) first appeared in Pliocene deposits dating to about 4 million years BP. Modern white rhinos first appeared (in Pliocene deposits in Kenya dated to approximately 7 million years BP) as the species Ceratotherium praecox. From the fossil evidence it is therefore likely that Ceratotherium split from Diceros in the early Pliocene, with existing white rhino species (C. simum) appearing in East African deposits 3 - 4 million years ago (Owen-Smith, 1988). The black rhino (also known as the Prehensile-lipped rhinoceros), is a browser and is also thought to be more primitive than the white rhino (or Square-lipped rhinoceros) which is a grazer (Anon., 1992b).

CLASS :	Mammalia				
ORDER :	Perissodactyla				
FAMILY :	Rhinocerotidae				
GENUS :	CERATOTHERIUM	DICEROS	RHINOCEROS	DICERORHINUS	RHINOCEROS
SPECIES :	simum	bicornis	unicornis	sumatrensis	sondaicus
COMMON NAME :	White Rhino	Black Rhino	Indian Rhino	Sumatran Rhino	Javan Rhino
STATUS :	(approximate numbers) 5 231	3 481	2 000	400-900	50 - 60
LENGTH :(M)	3,6-4,2	3,0-3,8	2,1-4,2	2,5-2,8	3,5
HEIGHT :(M)	1,5-1,85	1,4-1,8	1,1-2,0	1,0-1,5	1,8
WEIGHT : (MALE) (KG)	2100-3000	995-1360	1500-2000	800	1300

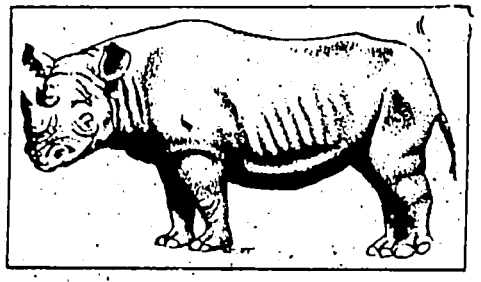
TABLE 1: TAXONOMY AND CHARACTERISTICS OF FAMILY RHINOCEROTIDAE (ADAPTED FROM BALFOUR AND BALFOUR, 1991)



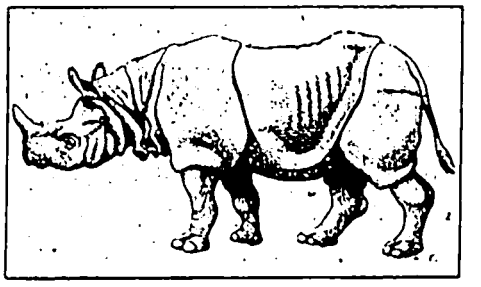
1. Javan rhino
(Rhinoceros sondaiacus)



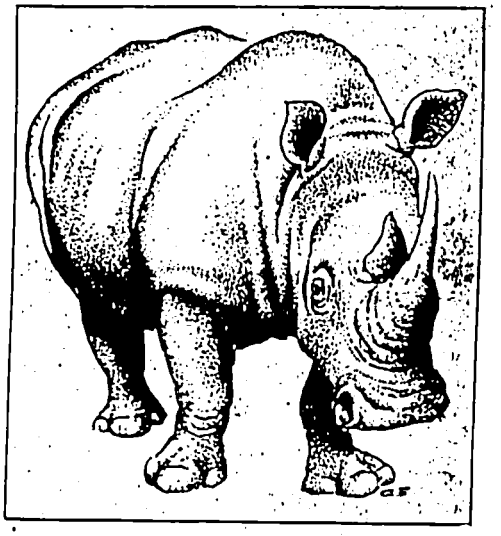
3. Sumatran rhino
(Dicerorhinus sumatrensis)



4. Black rhino
(Diceros bicornis)



2. Indian rhino
(Rhinoceros unicornis)



5. White rhino
(Ceratotherium simum)

FIGURE 1 MEMBERS OF FAMILY RHINOCEROTIDAE
(CITED IN REF NEWS, JUNE 1992)

3. HISTORICAL AND PRESENT DISTRIBUTION OF SUBFAMILY DICERINAE (THE AFRICAN RHINOS)

i). BLACK RHINOCEROS (*D. bicornis*) (Linnaeus, 1758)

Historically its distribution ranged from the south-western Cape to Somaliland and the northern Cameroons - Ivory Coast border. The species was however absent from the equatorial forest region of central Africa, preferring drier savanna and arid shrub steppe habitats. At present black rhino survive in scattered population fragments through this range, the large populations formerly occurring in the Luangwa Valley, Zambia and in southern Tanzania having been reduced to small remnants by poaching; the largest surviving population is currently that in the Zambezi valley, Zimbabwe (Owen-Smith, 1988).

World population estimates were :

1960	100 000
1970	63 000
1980	14 800
1990	3 000

In Africa south of the Sahara (excluding the Southern African subregion) a small number of black rhinoceros (less than 50) have been reported in Cameroon and the Central African Republic. Neither the survival of these animals nor the remnant population supposedly occurring in the Akagera National Park, Rwanda has recently been confirmed. In Kenya 300-400 occur, Tanzania under 200, Zambia under 50 and possibly a very small number still occur in Malawi. In the Southern African subregion they still exist in Namibia, the largest concentration of approximately 100 animals occurring in the Etosha National Park. In Zimbabwe, previously confined to the Zambezi valley and its environs, several have been translocated elsewhere including 160 which were established on private ranches between 1986 - 89 as part of an ongoing breeding programme. In Mozambique a remnant few may still occur in the Gorongoza National Park, this however is very unlikely. In Natal they occur mainly in the Hluhluwe Corridor - Umfolozi Game Reserve Complex from which small populations have been translocated to other game reserves in South Africa. Outside South Africa, Namibia and Zimbabwe, the species is close to extinction owing to continued poaching (Skinner and Smithers, 1990).

ii) WHITE RHINOCEROS (*C. simum*) (Burchell, 1817)

The historic distribution of the white rhinoceros was two discrete populations (refer figure 2). The southern

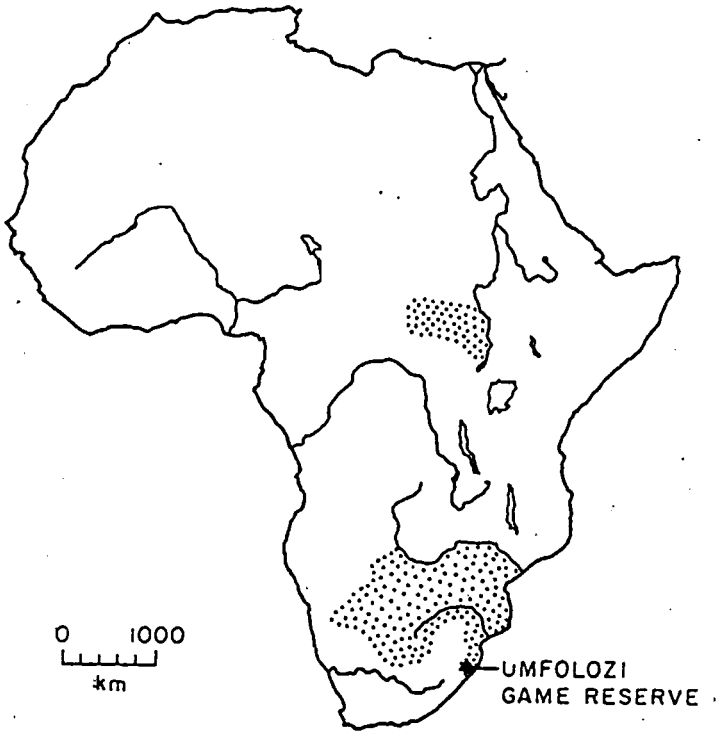


FIGURE 2 HISTORIC DISTRIBUTION OF THE WHITE RHINOCEROS (CITED IN OWEN-SMITH, 1988)

subspecies did not occur south of the Orange River, while in the east its southern limit was the present-day Umfolozi Game Reserve. The northern boundary of the range of the southern race was the Zambezi river and the region of the Namibian - Angola border. White rhinos also abounded in eastern Botswana as well as the adjacent parts of the western Transvaal. The northern subspecies was found only to the west of the Nile river from northern Uganda northwards to the vicinity of Shambe in Sudan and westwards into the Central African Republic (Owen-Smith, 1988).

In the wild the northern white rhinoceros is now only found in the Gambara National Park in Zaire (17 animals recorded in 1988). The Southern African population was all but exterminated during the late nineteenth century (Skinner and Smithers, 1990; Owen-Smith, 1988). Renshaw (1904) recorded a total of approximately 10 white rhinos in Zululand at the turn of the century. The first official estimate in 1930 revealed a total of 130 in the Umfolozi Game Reserve and on adjacent ground (Skinner and Smithers, 1990).

Since the proclamation of the Umfolozi Game Reserve in 1897, to protect the surviving southern population of white rhino, numbers have steadily increased reaching a peak of 2 000 animals in the Umfolozi-Hluhluwe region in 1970. From the 1960's white rhinos have been translocated from this population to restock other areas where the species formerly occurred. A total of 3 439 having been relocated (1240 out of South Africa and 2199 within South Africa). This remarkable effort by conservationists in South Africa has resulted in the southern subspecies being removed from the endangered category. The northern subspecies however remains endangered (Owen-Smith, 1988; Skinner and Smithers, 1990).

4. DESCRIPTION OF MEMBERS OF SUBFAMILY DICERINAE

1. BLACK RHINOCEROS (Diceros bicornis)

Also known as the hooked lip rhinoceros. The African Elephant and Rhino Specialist Group (of the International Union for the Conservation of Nature and Natural Resources (IUCN) recognises three subspecies :

a) D.b. michaeli in Kenya and Northern Tanzania

b) D.b. bicornis in Namibia

c) D.b. minor occurring in the bushveld from Natal through Zimbabwe and Zambia into southern Tanzania.

A northwestern group in Cameroon and the Central African Republic (D.b. longtipes) is also recognised. It is however doubtful that any of this group survives (Skinner and Smithers, 1990). A fifth subspecies (D.b. chobiensis) from northern Botswana may still occur. Although sightings of this subspecies have been recorded in the past decade its current status is uncertain (most probably extinct) (Walker, 1988).

Adult black rhinos have a shoulder height of about 1,6m and weigh between 800 - 1000kg. They can be distinguished from the white rhinoceros by their prehensile upper lip,(used for browsing), shorter head, longer neck and smaller, rounded ears. The black rhinoceros also lacks the nuchal hump possessed by its near relative the white rhino. Their overall body colour is dark grey; they however tend to take on the colour of the soil in their habitat through mud wallowing and dusting (Skinner and Smithers, 1990)

2. WHITE RHINOCEROS (Ceratotherium simum)

2 subspecies are recognised :

a) C.s. simum the southern subspecies

b) C.s. cottoni the northern subspecies

The northern subspecies is somewhat shorter (body length) and higher than the southern subspecies (Skinner and Smithers, 1990).

Adult white rhinos rank as the 3rd largest land mammals, males having an average shoulder height of 1,8m, females 1,77m. They weigh between 2 000 - 2 300kg for males, females around 1 600kg. They have a characteristic nuchal hump on their backs. They also have square lips for grazing. Their skin colour is grey, but is often coated with mud and dust giving them the colour of the surrounding soil (Skinner and Smithers, 1990). The colloquial name - white rhinoceros most likely originated from the early Dutch settlers description of black and white rhinos as 'zwart renoster' and 'witte renoster' respectively, although an opposing view holds that the term 'white' comes from an anglicization of 'weit' or 'wyd' describing their wide mouths (Balfour and Balfour, 1991).

5. CURRENT POPULATION ESTIMATES OF RHINOCEROS IN AFRICA

The most recent official estimates of rhino numbers in Africa were those reported by the African Elephant and Rhino Survey Group (AERSG), of the International Union for the Conservation of Nature and Natural Resources (IUCN),

at the Nyeri Meeting of the AERSG in May 1987 and are reflected in table 2. Current (1992) estimates carried out by the Rhino and Elephant Foundation (REF) (table 3) indicate that populations of black and white rhinos in South Africa and Namibia appear to be increasing despite a greater frequency of poaching incidents in these countries. In Kenya the numbers appear to be stabilising, while in the rest of Africa they continue to approach extinction.

Country	Black Rhinoceros (*Diceros bicornis*)	White Rhinoceros (*Ceratotherium simum*)	Population Trends
South Africa	> 577	>4 062	increasing
Angola	no data	0	-
Botswana	< 10	100-150	decreasing
Malawi	50	0	not known
Mozambique	small population may still occur in Gorongoza Nat. Park	0	already extinct once
Namibia	440-458	63	increasing
Swaziland	0	60-100	decreasing
Zambia	< 50	6	decreasing
Zimbabwe	<1 700	208	decreasing
Cameroon/Chad	< 30	0	decreasing
C A R	10	0	decreasing
Somalia	extinct	0	-
Ethiopia	extinct	0	-
Kenya	> 521	47	stable (may be increasing)
Rwanda	15	0	decreasing
Sudan	3	0	decreasing
Tanzania	< 200	0	decreasing
Zaïre	0	17	decreasing
TOTAL	aprox 3 606	aprox 4 560	

TABLE 2 NUMBERS OF BLACK AND WHITE RHINOCEROS IN AFRICA
(Based on estimates obtained by the International Union for Conservation of Nature and Natural Resources (1987), cited in Balfour and Balfour (1991)).

Year	Black Rhinoceros (*Diceros bicornis*)		White Rhinoceros (*Ceratotherium simum*)		
	Africa*	S Africa	Africa*	S Africa	*including S Africa
1970	65 000	-	-	-	
1980	14 785	630	3 841	2 500	
1984	8 800	640	3 947	3 300	
1987	3 805	580^	4 563	4 062	^Decrease due to trans location
1990	3 392	626	4 745	4 225	
1991	3 481	798	5 231	4 700	

TABLE 3 TRENDS IN RHINOCEROS NUMBERS IN AFRICA AND SOUTH AFRICA (From estimates obtained by the Rhino and Elephant Foundation (REF), June 1992).

6. POACHING AND ILLEGAL TRADE

Since 1977 all five rhino species have been listed under Appendix 1 of the Convention on International Trade in Endangered Species (CITES), which prohibits all trade in rhino products (in 1987 CITES extended its long existing ban on international trade in rhino products to include domestic trade). Despite having 110 signatories, the demand for expensive rhino products (particularly rhino horn) has kept illegal trade alive and cast doubts on the ban's effectiveness (Anon., 1992a; Tudge, 1991).

Poaching remains the greatest immediate threat for all rhino species, and consequently the first and most important step in any conservation strategy for the surviving African rhino population is the elimination of poaching.

Historical records trace trade in rhino horn to around the first century AD in China and India. The claimed curative powers of rhino horn are associated with the supposed medicinal properties of mythical Unicorn horn. In the middle ages Arab traders frequently marketed rhino horn as 'Unicorn' horn and up until 1741 'Unicorn' horn was an officially recognised drug in England (Balfour and Balfour, 1991).

At present rhino horn is in demand in Yemen to fashion dagger handles. It has been for the last 2 000 years and still is important to Chinese medicine, not (as it is widely believed in the western world) as an aphrodisiac, but mainly in the treatment of fever, flu and convulsions. Rhino horn is only used as an aphrodisiac in India, and this aphrodisiac trade accounts for less than 1% of the total world trade in rhino horn. In other Asian countries, such as South Korea and Thailand, in addition to trade in rhino horn, other rhino products, including skin, nails and rhino penis, are in demand to treat a variety of disorders (e.g. menstrual disorders) (Tudge, 1991).

SUPPLY OF RHINO PRODUCTS

The killing of rhino and trade in rhino products are illegal practices in all African countries. Chilvers (1990) names Burundi, in Central Africa, as a 'trading hot spot' for rhino products despite its clamp down on trading since 1987. Of 20 African countries that had rhino, 5 have not signed CITES. Namibia (which is not a signatory to CITES) was the last country to allow trade in rhino horn but has since 1984 voluntarily complied with CITES, as do the National Republics within South Africa, which set up an Endangered Species Protection Unit in 1989 to stop smuggling. Kenya and Zimbabwe also conduct a vigorous 'rhino war' to stop poaching. Government indifference (at best) and more commonly sickening corruption have rendered CITES impotent and other bans and treaties meaningless in all other African countries still possessing some rhino. With the explicit consent of corrupt government officials, poachers have decimated rhino populations in Tanzania and Zambia, resulting in fewer than 200 remaining in Tanzania and less than 100 in Zambia (from original populations of 3 000 and 3 500 respectively, less than 15 years ago). Government indifference resulted in rhino numbers being reduced from 3 000 to 3 between 1980 - 1990 in the Central Africa Republic and in the same time period from 110 to 30 in Cameroon. Populations in Chad and Sudan have become extinct and at the time of writing it is likely that those in the Central African Republic and Cameroon have followed suit. In the face of protracted civil wars in Angola, Mozambique, Ethiopia and Uganda, wildlife administration has all but vanished, and along with it the rhino populations in these countries (Chilvers, 1990, Tudge, 1991).

The poaching epidemic which swept through Central and East Africa has steadily moved south as rhino populations have become depleted. Between 1980 - 1985 Zambia was a major hunting ground; as rhino became scarce in Zambia the poachers moved south into the Zambezi valley areas of Zimbabwe (which, in 1985 housed the largest remaining black rhino population in Africa (Hall-Martin, 1988).

In a single afternoon in January, 1985 6 black rhino were killed in the lower Zambezi valley (Chilvers, 1990). Despite a vigorous anti-poaching campaign by Zimbabwe's Department of National Parks, Dr Esmond Martin (United Nations Envoy responsible for Trade in Wildlife) warns that the population in Zimbabwe faces extinction with only 249 surviving in December 1992, from more than 1 600 counted in 1990. (Anon., 1992c). As Southern Africa begins to stabilise and countries like Mozambique prepare to demobilise thousands of soldiers, so South Africa must begin to brace itself for an onslaught of poaching in the form of cross border raids. South Africa has become a prime target holding 63% of the remaining rhino in Africa. Since 1990 the Natal reserves have lost 11 rhino to poachers and the Kruger National Park (which shares a 350km border with Mozambique and Zimbabwe) has lost 8 (Clarke, 1993b). Additionally there may be no black rhino left in Botswana's Chobe Reserve and only 6 white rhino, despite the donation of 90 white rhinos to Botswana by the Natal Parks Board between 1974 and 1981 (Clarke, 1993b). Botswana thus appears to be joining Mozambique in allowing its rhino populations to become extinct twice. In Swaziland the level of poaching has reached dangerous proportions (Walker, 1992).

DEMAND FOR RHINO PRODUCTS

In the 1980's Yemen, in the Arabian peninsula, was the chief consumer, importing 1 500kg of African horn per year (About half of the total poached each year) which was being fashioned into dagger handles (Tudge, 1991). Rhino horn handles on ceremonial daggers have long been seen a symbols of wealth and status. Although not a CITES signatory at the time, the North Yemeni government banned the import of rhino horn in August 1982, but did little to enforce this ban. The implementation of a six point strategy aimed at gradually eliminating the rhino horn trade in N Yemen in 1986 and 1987 legislation banning the exports of rhino products from N Yemen, coupled with a downturn in the North Yemeni economy has however resulted in the Yemeni trade diminishing to a trickle (Balfour and Balfour, 1991; Tudge 1991).

Japan, which imported 800 kilograms of rhino products per year in the 1970's to make medicines, has virtually legislated the trade out of existence; joining CITES in 1980, and urging doctors and pharmacists to promote the use of substitutes (Tudge, 1991). In Hong Kong, Macao, Malaysia and Dubai legislation suppressing trade (Import, export and domestic sales) together with the promotion of substitutes has helped reduce demand (Tudge, 1991).

Four countries however remain a problem: China, South Korea, Taiwan and Thailand.

i) China:

Once possessed rhinos of its own (Javan rhinos), but had already rendered them rare by the 8th century AD, and has been a major importer of rhino horn ever since. China refuses to enforce the 1987 ban on domestic trade, claiming to be dispersing horn stockpiled prior to 1981 (the year it joined CITES). Surveys, however, indicate that it still imports an estimated 650kg of rhino horn per year as well as exporting large quantities since few local chinese can afford to buy the enormous amounts of medicine china produces (Tudge, 1991).

ii) South Korea:

Rhinoceros horn is still widely available as a medicine in South Korea. The South Korean government refuses to join CITES, and has made no move to register its existing stocks. It did however, outlaw the use of rhino horn in manufactured medicines in 1983 and banned imports in 1986. TRAFFIC (the Trade Records Analysis of Flora and Fauna in Commerce), however slates the ban as ineffective because it does not control stockpiled rhino horn, so there is no way of policing the trade or distinguishing newly imported material from that which has been stockpiled already, and as recently as 1988 TRAFFIC found it in 80% of medicines in Seoul. In a recent survey a Korean researcher posing as a customer asked clinics for medicines for a sick relative in Japan, describing symptoms for which rhino horn medicines are normally prescribed. Of 111 pharmacies surveyed (in 5 cities), 71 either had pure horn or medicines containing it for sale. The researcher also found it available in 7 clinics that had denied stocking it to a previous International Union for the Conservation of Nature and Natural Resources (IUCN) survey. In 1990 the retail price was around $4 410/kg. TRAFFIC believes some of this horn comes from South Korea's stockpiles (obtained 'legally' prior to the government ban on rhino imports in 1986), but that large quantities are still being imported from Indonesia and from Africa (via Japan, Singapore and Thailand) (Cross, 1990; Tudge, 1991).

iii) Taiwan:

Vast quantities of African rhino horn were smuggled into Taiwan from South Africa until 1988 when South Africa squashed exports, stifling the trade. This shifted attention to Asian horn (which is thought to be more

'concentrated' due to its smaller size) retailing at up to $60 000 per kg (the importers themselves paying around $20 000 per kg or 5 times more than they would have paid for African horn). These high prices together with dwindling supplies of Asian rhino horn (as the Asian rhino populations are pushed towards extinction) has focused attention, once again, on African rhino horn, with Taiwanese traders viewing it as a solid investment. Taiwan banned international trade in rhino products in 1985 but only began enforcing this ban in 1990. Currently the Taiwanese Council of Agriculture requires that doctors and herbal medical dealers register their rhino horn stocks and is considering banning all domestic trade by 1995 (Anon., 1993b; Tudge, 1991).

iv) Thailand:

Is one of the world's centres for black marketeering, with Bangkok being a major market for rhino products, including the horn, skin, nails, penis and dried blood. Thailand belongs to CITES but according to Dr Esmond Martin (United Nations Envoy for Trade in Wildlife) suffers from what he refers to as 'Bureaucratic inertia'; the consequence of this 'inertia' (according to TRAFFIC) is that Thailand makes 'a mockery of others conservation efforts' (Tudge, 1991). In a March, 1992 survey Martin found that fewer Bangkok pharmacies were selling rhino products compared with a survey conducted in 1990. Prices had also only increased 10% per annum from 1990 - 1992 despite major growth in the Thai economy, indicative of decreased consumer demand. Less rhino products were openly displayed due to increasing awareness of the illegality of owning rhino horn from Asian species, coupled with fear of possible government inspection of shops. It is important to remember, however, that the results are likely to be slightly optimistic with some pharmacists undoubtably falsely denying possession of rhino products (Martin, 1992). For rhino conservation the Wildlife Act of February 1992 is the most promising piece of legislation to be passed in Thailand in many years stipulating heavy fines and prison sentences for hunting Thai rhino in designated conservation areas, as well as for trading, illegal possession and import or export of rhino products. Penalties apply equally to perpetrators and accomplices (Martin, 1992).

7. DEALING WITH POACHING AND ILLEGAL TRADE: CAN IT BE STOPPED?

TRADE

Encouragingly it appears that trade can be regulated and even stopped provided all countries actively pursue the following course of action;

1. There must be creation of internationally enforceable legislation with violations resulting in arrests, fines, inprisonment and bad publicity (Chilvers, 1990). Such legislation has 2 layers. Firstly the rules of CITES and secondly domestic legislation and policing to allow for the enforcement of CITES rules. Currently CITES has 110 signatures (Tudge, 1991).

2. The use of substitutes for rhino products (such as water buffalo horns and camel nails for dagger handles and saiga antelope horn for medicinal purposes) (Chilvers, 1990; Tudge, 1991). Substitution is a key issue and many consumers (including both the Yemenis and the Chinese) have shown willingness to accept buffalo horn and saiga antelope substitutes (Tudge, 1991).

   As mentioned earlier Yemen, Japan, Hong Kong, Macao, Malaysia and Dubai have all passed legislation to back CITES ground rules. Continued enforcement of the legislation as well as active promotion of substitutes will hopefully stamp out trade (which is already very reduced) in rhino products in these countries. International pressure in the form of economic sanctions and bad publicity must be urgently applied against China, South Korea, Thailand and Taiwan. Pressure from conservation agencies has already resulted in a certain amount of legislation being passed to limit trade in rhino products. The implementation of economic pressure in the form of international sanctions may well results in the flurry of legislation, enforcement and co-operation with international conservation authorities required to squash the trade in rhino products in these countries. Failing this, one last possibility remains, legal controlled trade in rhino products, ensuring sustainable utilisation of the remnant rhino populations (this option is discussed in the section on sustainable utilisation).

POACHING

At the Rhino Conservation Workshop held at Skukuza, Kruger National Park in 1988, speakers from various conservation agencies in Africa put forward their strategies for saving Africa's remaining rhinoceros populations.

1. Kenya: The Rhino Action Plan

   Kenyan wildlife authorities are currently engaged in capturing black rhino in isolated areas and relocating them in well guarded, fenced sanctuaries. In 1987 the

government erected a high-voltage, electrified fence around the small Lake Nakuru National Park and moved in 17 black rhino from other areas to join the existing pair. By 1990 matings had been observed. By 1990 the 100 of the then approximately 200 black rhino remaining in Kenya had been transferred to fenced, patrolled sanctuaries on both park and private lands. Despite such high security, poaching still continues. An incident of note being the killing of five white rhino, relocated from Umfolozi Game Reserve, which were herded into a stockade at night as well as having a 24 hour armed guard. All 5 were killed when a gang of 30 poachers armed with automatic weapons attacked the homes of the warden and park rangers, simultaneously slaughtering the rhino and hacking off their horns with chainsaws (Balfour and Balfour, 1991).

2. Zimbabwe: Operation Stronghold

Operation Stronghold's main task was to detect poachers and intervene before they killed any rhino, but since 1986 it has been saving rhino by killing Zambian poachers (Chilvers, 1990). The anti-poaching operation is Zimbabwe's frontline of defence and is the major field action. To minimise the loss of animals to poachers, the second important component of Zimbabwe's anti-poaching strategy is the capture and translocation of the rhino out of the Zambezi valley. Translocation of rhino to other relatively safe areas within Parks and Wildlife land where these animals are known to have existed previously are presently taking place (Tatham and Taylor, 1989). Tatham and Taylor (1989) noted that up to and including 1989, 154 animals had been translocated to safe areas of Parks and Wild Life land and an additional 79 had been placed on safe areas of private land with several being moved abroad. Zimbabwean conservationists have also embarked on a dehorning programme similar to the one in Namibia (this is more fully discussed in the paragraph on Namibia's conservation strategy) (Wright, 1991). The Department of Parks and Wild Life Management is however, understaffed and short of funds; with around $10 per square kilometre (Chilvers, 1990) available for wild life protection, when in 1989 around $400 per square kilometre was needed to effectively counter poaching (Anon, 1989).

3. Namibia

A cooperative effort between the central government and local tribesmen to save the regions rhino and elephant led to the hiring of local Hereros as "auxiliary game guards" by their own headman to patrol their land and report on poaching activities, thereby protecting what had essentially become "their" rhinos. This "auxiliary" game guard project was started with the establishment of the Namibia Wildlife Trust rhino project in 1982 and Namibia's black rhino population of 400 (1990 census) is now considered to be stable (Chilvers, 1990). Additionally Namibian government conservationists have relied on an imaginative but controversial method of deterring poachers; removing the horns from selected rhinos. The dehorning experiment was started in 1989 and the dehorned animals have since been closely monitored for ill effects. The Namibian Game Capture Unit reports that thus far no ill effects have been observed. Dehorned females have mated with normal males, producing at least 3 calves by 1991 which the mothers were successfully defending against predators. Basically the dehorned animals appear normal in every respect and by 1991, 12 rhino had been dehorned. Dehorning has however not helped stop poaching in Zimbabwe, with 8 dehorned animals being poached since April 1992; the poachers hacking off stubs of horn that have regrown (Anon., 1993a). Black rhino horn regrows at a rate of 3cm per year (Anon., 1992b).

4. Swaziland

Swaziland, which possesses small reintroduced populations of both black (6) and white (100) rhino, had experienced 8 poaching incidents by the end of 1989. Currently the country's small conservation department is busy translocating rhino to smaller, better protected reserves in preparation for a heavier poaching onslaught expected from the north (Balfour and Balfour, 1991).

5. South Africa (including the Republics of Transkei, Bophuthatswana, Venda and Ciskei).

In 1989 a conservation plan for the black rhino in South Africa was drawn up by the Rhino Management Group (RMG), which was established at the Rhino Conservation workshop held at Skukuza, Kruger National Park, 1988. With poaching currently a less serious problem in South Africa than in the rest of Africa,

and a healthy, increasing white rhino population, the attainment of a sufficiently large population of black rhino in Southern Africa, as rapidly as possible was the main goal of the national conservation strategy drawn up by RMG. The primary aims of this plan were (Brooks, 1989):

a) To establish and conserve in the long term a genetically viable population of 2 000 + black rhino of the southern-central Africa subspecies (D.b. minor), in its natural habitat.

b) To develop and conserve in the long term, a genetically viable population of at least 2 000 black rhino of the south-western African subspecies (D.b. bicornis) in its natural habitat in the region.

c) To develop and conserve a population of at least 100 rhino of the subspecies (D.b. michaeli) in the wild.

d) To support captive breeding programmes for all 3 subspecies, both within and outside their regions and the African continent, provided these captive populations could play a significant and sustained role in maintaining or improving the conservation status of the species.

The philosophy underlying the conservation aims for the black rhino is based on the perceived need to prevent extinction due to man-induced changes and to maintain the evolutionary potential of the species (Brooks, 1989). It was this philosophy which brought the southern white rhinoceros back from the brink of extinction in South Africa.

The achievement of these aims involves the management of existing populations, the support of captive breeding programmes and the translocation of rhino from areas of high population density to other areas suitable for the establishment of new herds. Hearne and Swart (1991) devised a mathematical model to determine at what rate and from which age and sex groups rhino from high density populations should be removed (translocated) so as to maximise the overall growth rate of the Southern African population.

In accordance with the captive breeding programme proposed by the RMG, the Natal Parks Board sent 7 black rhinos to Texas in 1989 (Balfour and Balfour, 1991). The translocation was however, not without problems and 3 animals died (Chilvers, 1990). Generally the establishment of breeding populations abroad has however been reasonably successful. By 1990 Game Conservation International (Game Coin) had moved 15 rhinos out of Africa of which 5 had died and to which 3 calves had been born (Tennison, 1990).

Capture and translocation of both black and white rhino within South Africa, by the Natal Parks board has been a resounding success - in 1989, for example the Natal Parks Board translocated 300 rhinos (both black and white) without a single mortality (Montgomery, 1989).

Only the southern sub-species of the white rhino (C.s. simum) occurs in South Africa, and efforts to conserve it in South Africa culminated in 1965 with it being removed from the category A protection list of the IUCN ('threatened with extinction') and declared ' no longer endangered', the only animal ever to achieve this distinction (In 1989 CITES down listed it to Appendix II). From a population of about 30 animals in the Umfolozi Game Reserve in the 1920's in excess of 4 000 animals occur in South Africa today (Balfour and Balfour, 1991). At the end of 1989 a total of 1 240 had been relocated out of South Africa and 2 199 within South Africa (Skinner and Smithers, 1990). Conservation of white rhino in South Africa can therefore be seen a having been a resounding success in all aspects except one: The Conservation of white rhino on private land.

By 1989, 1 291 white rhino had been translocated to 149 privately owned properties from the Natal Parks Board and other resources. 43 died during or shortly after delivery; A total of 316 calves were born, with 284 surviving the weaning period. A total of 1 532 rhino were therefore successfully established on private land, of which 92 were sold or removed alive, leaving 1 440 rhino on private land (Buys and Anderson, 1989). A 1987 survey by the Rhino and Elephant Foundation (REF), however revealed only 931 white rhino on 103 properties; this decrease of 509 rhinos included the loss of all rhinos on 46 of the ranches. The poor performance of white rhino on private land is particularly disconcerting when compared with their performance in the Pilansberg National Park, Kruger National Park and Natal Parks Board reserves. Pilansberg National Park, Bophuthswana is of particular interest because despite legal hunting and translocation of surplus animal, the population in the Pilansberg is stable and those in the Botsalano and Borakalalo National Parks (translocated from Pilansberg) are increasing (Buys and Anderson, 1989).

Buys and Anderson (1989) who conducted the REF survey of white rhino on private land give several reasons for the poor performance of the white rhino populations on private land, these include :

i) unsuitable conditions

ii) lack of supplementary feeding

iii) overstocking by more adaptable species

iv) reducing the number of adult males to one, thereby halting recruitment, and,

v) the most important problem they noted was that the land owners appeared to be buying the rhino simply as a business proposition rather than for conservation reasons.

In spite an unpredicted drop in the black rhino numbers, apparently due to habitat degradation for browsers, Natal Parks are virtually the only source of 'surplus' rhinos in Africa, supplying about 19 black and 130 white rhino per year to other conservation areas (Chilvers, 1990). The key factor that has allowed South African rhino populations to thrive for the last 3 decades, while the rhino populations of Central and East Africa have crashed, has been the virtual absence of poaching. Brooks (1989) notes that poaching in South Africa has been sporadic and of low intensity, not associated with the well-organised, armed gangs characteristic of the rest of Africa. As mentioned earlier, however, the 'rhino war' is moving southwards as the rhino populations elsewhere become increasingly depleted, and all future conservation efforts will have to include a strong anti-poaching package.

6. The Rest of Africa

Tanzania, Zambia, Central African Republic, Camaroon, Chad Sudan, Angloa, Mozambique, Ethiopia and Uganda are aptly described by Chilvers (1990) as "Africa's basket cases". In Ethiopia, Uganda, Angloa, Sudan, Chad and Mozambique rhino are extinct, while in Zambia, Tanzania and Zaire, the national parks are under-financed, under-staffed, and have poorly trained, unmotivated anti-poaching teams. Government corruption and indifference to the plight of the rhino will likely result in the extinction of the remaining populations in the near future (Chilvers, 1990). Botswana appears to be following suit with recent reports indicating that wildlife all over Botswana is on the decline (Clark, 1993a).

8. SUSTAINABLE UTILISATION: AN ALTERNATIVE APPROACH

A central issue in 20th century conservation is that wildlife should be viewed and utilised as a sustainable resource. According to Tudge (1991) "conservation will not work unless 'preserving' wildlife is good for the local people". In practice, sustainable utilisation of wildlife means treating game parks not as museums or zoo's but rather as local industries that generate income for the human residents through tourism, trophy hunting, sales of breeding stock to private game ranches, marketing of venison and other ventures that enlist the locals as partners in the conservation effort (Keller, 1992). Richard Leakey, the director of the Kenya Wildlife Service, believes that sustainable utilisation means tourism, which already provides Kenya with a third of its income. Leakey feels hunting is both wrong and misguided and seeks to ban trade in ivory and rhino horn altogether (Tudge, 1991).

The South African, Namibian and Zimbabwean conservation authorities feel differently, believing that tourism alone cannot provide the income they need, and that additional income from controlled trophy hunting and a legitimate trade in rhino horn and ivory would benefit both conservation efforts and the local populace, leaving them well disposed to the animals (therefore decreased poaching) as well as allowing for the expansion and improvement of existing reserves (Namibian, South African and Zimbabwean National Parks have huge reserves of ivory and horn worth millions of dollars on the open market) (Tudge, 1991).

In June 1991 a workshop was convened by the KwaZulu Bureau of Natural Resources and attended by a number of senior members of various government conservation bodies. At this workshop a resolution was adopted requesting the Rhino and Elephant Foundation to investigate the viability of legal trade in rhino horn (Walker, 1991). The South African conservation authorities arguement to legalise trade carries much weight, since South Africa has a rapidly expanding human population, and wildlife in South Africa has very poor prospects unless it can help meet increasing human demands. Additionally South Africa has some of the worlds best-run national parks and, currently the best protected wildlife in Africa. Conservation policies of the South African conservation authorities (the Natal Parks Board in particular) have brought the southern white rhinoceros (c.s. simum) from the brink of extinction to a population now approaching 5 000 animals (Tudge, 1991). At present South Africa protects 20% of all black rhino in Africa and 90% of all white rhino (Walker, 1991); this adds up to 63% of all rhino on the African continent (based on 1991 figures). Zimbabwe is unique in that it devotes 22% of its total area to wildlife reserves, with one third of its land under wildlife management.

Tudge, 1991). Furthermore its now in its eighth year of Operation Stronghold (the paramilitary campaign against poachers crossing from Zambia) with in excess of 60 poachers having already been shot. Currently Zimbabwes conservation authorities are critically short of funds and feel that controlled legitimate trade in rhino horn would provide then with the funding needed to implement a bold survival plan which consists mainly of dehorning all the rhino left in Zimbabwe, moving them out of vulnerable areas, establishing breeding populations in Zimbabwe and abroad as well as keeping the populations in Zimbabwe inside 'intensive protection zones' (Raath, 1993). In Namibia the additional funding generated by legal trade would allow for an intensification of conservations efforts as well as for increasing involvement of the local population in conservation, through self-help schemes and additional 'auxiliary' game guards.

The Kenyans, however, feel that if the southern Africans create a legitimate trade, poachers will steal horn and ivory from everywhere, and feed it into the markets. A recently developed technique based on measurement of light stable (non-radioactive) isotopes by mass spectrometry, may, however, allow the Kenyans preservation policy to co-exist with the sustainable utilisation policy of Zimbabwe, South Africa and Namibia. The technique, developed by archaeologist Nick van der Merwe (a professor at both Harvard and the University of Cape Town), uses a mass spectrometer to analyze the isotopic composition of a horn sample the size of a fingernail paring. The technique can identify both the donar's species and the park in which it lived. Since black rhino browse on leaves and twigs while white rhino are strictly grazers, the ratio of carbon-13 to carbon-12 easily delineates the 2 species (This is because tropical African grasses adopt the 'C4' method of photosynthesis, while trees and shrubs are 'C3' photosynthesisers). The analysis of 3 additional elements - nitrogen, which reflects the relative aridity of the region, and strontium and lead, which are clues to the age of the geological substrate - allows the sample to be pinpointed to a specific park (Baskin, 1991). The technique can therefore determine whether the horn comes from one of the Southern African counties or from Kenya.

At the March 1992 meeting of CITES held in Kyoto, Japan, South Africa proposed to downlist its white rhino population from Appendix I to Appendix II and Zimbabwe proposed the same for both its black and white rhino in order to allow for legalised trade in rhino products. Neither of these proposals were accepted, however, since the IUCN was of the view that it would be too risky to reopen commercial trade in these products without a clearer understanding of the possible effects on rhino populations elsewhere in Africa and in Asia (Swart, 1992).

The outcome of the 1992 CITES meeting shows the divergence of opinion currently hampering rhino conservation efforts and was aptly summed up by Gregory Stuart-Hill, Chief Ecologist of the Bophuthatswana Parks Board who was recorded in the New York Times (27 December, 1992), as having said, "People in America see two Africas, one is wide open spaces filled with animals running wild. The other is impoverished people. They never put the two together. What we (Southern African Conservation Authorities) try to do, is put the two together".

9. THE FUTURE OF RHINO IN AFRICA

The black rhino and northern subspecies of white rhino has virtually disappeared from Africa because it was more valuable to local people dead than alive. This perception must change if the rhino are to have any future in Africa. Besides poaching, a major cause of the decline in the numbers of all species of rhino has been the loss of habitat caused by the clearing of bush and forest for human settlement and agriculture. Currently the world population, and particularly that of Africa continues to increase, in the words of Lance Morrow (1992); "Much of the continent (Africa) has turned into a battleground of contending dooms: AIDS and overpopulation, poverty, starvation, illiteracy, corruption, social breakdown, vanishing resources, over-crowded cities, drought, war and the homelessness of war's refugees. Africa has become the basket case of the planet, the 'Third World of the Third World', a vast continent in free fall.....".

Where do conservation authorities go from here? Neither the killing of poachers nor the banning of trade in rhino horn has brought a stop to the decimation of Africa's rhino populations. In 1960 there were more than 100 000 rhino in Africa, today less than 9 000 remain. The survival of rhino is in the hands of the people of Africa and any future conservation efforts must also invest in these people. Partnerships must be formed between conservation authorities running National Parks and people bordering on these parks. Government agencies in South Africa, Namibia and Zimbabwe hold large stocks of rhino horn and its been suggested that a legitimate market be created for this horn; income received from the sale of rhino horn being ploughed back into conservation and also being used in programmes of benefit to the local populace. This will establish a value for the rhino as a sustainable resource and promote the farming of rhino for their horns, which can be repeatedly marketed through dehorning, rather than the poaching of rhino for one-off benefits.

Ultimately, if rhino (and all wildlife for that matter) are to survive in Africa they must pay for their survival.

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