

Trade in rhino horn from eastern Africa to Yemen

Esmond Martin and Lucy Vigne

PO Box 15510, Mbagathi, Nairobi, Kenya; email: rhino@wananchi.com

Abstract

Almost all rhino horn that entered Yemen from 1998 to 2002 originated from rhinos killed in the Democratic Republic of Congo, Kenya and Tanzania. In the late 1990s little poaching was recorded in eastern Africa, but in 2002 Kenya experienced the worst poaching in more than 12 years. The number of rhinos killed from 1998 to 2002 in the three countries was an estimated minimum of 46. From this figure we ascertain the potential weight of rhino horn that may have reached Yemen to be an average of 29 kg a year. Poaching is mainly by snaring or shooting with rifles. Most horns are smuggled to Djibouti and then by dhow to the Yemen coast among consignments of alcohol, which are illicitly moved to Sanaa. The price of horn increased from USD 519–650/kg when exported from Kenya to USD 750/kg from Djibouti and USD 1200/kg in Sanaa in 2002.

The price for horn in Sanaa has remained the same in US dollars since around 1985. In 2002 we counted 70 workshops with 102 craftsmen making traditional *jambiyas* (daggers); the most prestigious are made with rhino horn handles. The number of craftsmen has increased since 1985 as the human population has grown. Nearly all handles, however, are made from the horn of water buffalo. The number of rhino horn handles being made has fallen significantly, mainly because of the shortage of rhino horn on the market. In 2002 the Yemen government brought in proper legislation to implement CITES and has expanded its staff involved in wildlife conservation at the upgraded Environment Protection Authority. To help reduce demand for rhino horn, we produced a poster in Arabic against the buying of *jambiyas* with new rhino horn handles and distributed it widely.

Résumé

Presque toutes les cornes de rhinos qui sont entrées au Yémen entre 1998 et 2002 provenaient de rhinos tués en République Démocratique du Congo, au Kenya et en Tanzanie. A la fin des années 1990, on relevait peu de braconnage en Afrique Orientale, mais en 2002, le Kenya a connu le pire braconnage depuis plus de 12 ans. Le nombre de rhinos tués entre 1998 et 2002 dans ces trois pays est estimé à un minimum de 46 animaux. D'après ce chiffre, on évalue le poids de corne de rhino qui pourrait avoir atteint le Yémen à une moyenne de 29 kilos par an. Le braconnage se pratique principalement au piège, ou à l'arme à feu. La plupart des cornes sont passées en fraude jusqu'à Djibouti et de là, en boutre, vers la côte yéménite au milieu de cargaisons d'alcool qui sont acheminées en fraude jusqu'à Sanaa. Le prix de la corne augmente de US\$ 519–650/kg lorsqu'elle quitte le Kenya à US\$ 750 en passant à Djibouti, puis à US\$ 1200 à Sanaa, en 2002.

Le prix de la corne à Sanaa est resté le même en dollars depuis 1985 environ. En 2002, nous avons dénombré 70 ateliers et 102 artisans fabriquaient les traditionnels *jambiyas* (poignards) ; les plus prestigieux sont faits avec un manche en corne de rhino. Le nombre d'artisans a augmenté depuis 1985 parce que la population entière a augmenté. Presque tous les manches sont cependant faits en corne de buffle d'eau. Le nombre de manches en corne de rhino a chuté significativement, principalement par manque de corne de rhino sur le marché. En 2002, le gouvernement yéménite a rédigé une législation adéquate pour mettre en œuvre la CITES et a augmenté son personnel impliqué dans la conservation de la vie sauvage dans l'Autorité de la Protection de l'Environnement qui a été revalorisée. Pour aider à réduire la demande de corne de rhino, nous avons édité un poster en arabe, contre l'achat de *jambiyas* avec un nouveau manche en corne de rhino, et nous l'avons largement diffusé.

Introduction

For over 20 years most horn from illegally killed rhinos in Africa has been sent to Yemen to be made into handles for traditional daggers, called *jambiyas* (Martin et al. 1997). Although quantities of horn have declined significantly from the early 1980s, when about 1250 kg per year were imported into Yemen, since the late 1990s around 30 kg annually were coming into the country (table 1). This paper examines Yemen's rhino horn trade from 1998 to 2002, looking first at poaching and trade to Yemen under 1) rhino poaching, 2) information on the poachers, 3) trade routes through the Democratic Republic of Congo (DRC), Kenya and Tanzania, 4) export prices for rhino horn out of eastern Africa, and 5) trade routes from Africa to Sanaa in Yemen.

Data are presented on findings in Yemen's capital, Sanaa, that include 1) numbers of workshops and

craftsmen, 2) the making of jambiya handles, and 3) prices for jambiyas. The final section of the paper discusses the conservation strategies that have been introduced into Yemen to reduce demand for new rhino horn from Africa. With the backing of several international conservation organizations, we have been working on these strategies since the 1980s and have made some progress in law enforcement and CITES, and in discouraging the use of new rhino horn.

Trade in rhino horn from Africa to Yemen from 1998 to 2002

Rhino poaching

Three countries left with rhinos are supplying Yemen with horns: DRC, Kenya and Tanzania. Kenya has by far the largest remaining number: about 430 black and 170 white, next is Tanzania with about 49 black, and then DRC with about 30 white rhinos (Anon. 2002). In 2001 and 2002 more rhinos were poached in Kenya than in Tanzania and DRC combined (tables 2 and 3).

Kenya official statistics from 1998 to 2002, which of course are minimum figures, show that most of the 26 poached rhinos had their horns taken (table 2). In 1998, poachers shot dead one black rhino in Ol Pejeta Game Reserve, one in Tsavo West National Park and four white rhinos in Solio Game Reserve. No poached rhinos were recorded in 1999.

Information is known in detail for the later poaching incidents. In 2000, two black rhinos were poached. The first, a female, was speared and died near the Masai Mara Game Reserve in the Lelata Naikara area. Extraordinarily, the horns were not removed although the hind legs, sexual organs, tail and teats had been cut out with a panga and taken (Kenya Wildlife Service, pers. comm. 15 June 2000). None of these body parts would have been exported to Yemen. They were probably for use in East Africa as traditional medicines. The authors know of no other incident like this in eastern Africa where the horns were purposely left but other parts taken instead. The

Table 1. Minimum weight (kg) of rhino horn bought by the main jambiya-making family from 1980 to 2002

Year	Amount (kg)	Country of origin of horn
1980	1050	Kenya, Ethiopia, Somalia, Tanzania
1981	1320	Ethiopia, Sudan, Tanzania
1982	1585	Ethiopia, Sudan, Tanzania
1983	1120	Kenya, Sudan
1984	1058	Somalia, Tanzania
1985	475	Ethiopia, Sudan
1986	100	Sudan
1987	ca 250	Kenya, Sudan, Tanzania
1988	ca 250	Kenya, Sudan, Tanzania
1989	ca 250	Kenya, Sudan, Tanzania
1990	ca 333	Kenya, Sudan, Tanzania
1991	ca 450	Kenya, Sudan, Tanzania
1992	150	East Africa—imported from Oman
1993	80	Unknown—imported from Dubai
1995	30	Unknown
1996	15	Eastern Africa
1998	< 30	DRC and Kenya—imported from Djibouti
2000	< 20	Kenya—imported from Djibouti
2002	ca 30	Eastern Africa—imported from Djibouti

Source: Data from rhino horn traders in Sanaa collected by Esmond Martin and Lucy Vigne

Between 1980 and 1993 the figures represent about 80% of the total imports of rhino horn into Yemen.

DRC – Democratic Republic of Congo

Table 2. Number of known rhino poaching incidents in Kenya from 1998 to 2002

Location	Approximate date poached	Horns present or absent	How killed	Age at death (years)
BLACK RHINOS				
Oi Pejeta Game Reserve	29.01.98	absent	shot by rifle	12
Tsavo West National Park	1.06.98	present	shot by rifle	21
Lelata Naikara area	15.06.00	present	speared	20
Kitich, Mathews Range	8.10.00	present	shot by rifle	21
Tsavo East National Park	8.11.01	absent	shot by rifle	17
Tsavo East National Park	24.11.01	absent	shot by rifle	0.4
Tsavo East National Park	24.11.01	absent	shot by rifle	16
Tsavo East National Park	25.11.01	absent	shot by rifle	14
Tsavo East National Park	8.01.02	absent	shot by rifle	16
Tsavo East National Park	31.01.02	absent	shot by rifle	12
Lake Nakuru National Park	15.05.02	absent	snared	14
Lake Nakuru National Park	15.05.02	absent	snared	adult
Solio Game Reserve	31.10.02	absent	snared	adult
Solio Game Reserve	1.11.02	absent	snared	adult
Solio Game Reserve	1.11.02	absent	snared	adult
Solio Game Reserve	13.11.02	absent	snared	adult
Total number poached 16				
WHITE RHINOS				
Solio Game Reserve	7.02.98	present	shot by rifle	adult
Solio Game Reserve	7.02.98	?	shot by rifle	adult
Solio Game Reserve	7.02.98	?	shot by rifle	adult
Solio Game Reserve	7.02.98	?	shot by rifle	adult
Solio Game Reserve	2.08.02	present	snared	adult
Solio Game Reserve	5.08.02	present	snared	adult
Solio Game Reserve	3.10.02	present	snared	adult
Solio Game Reserve	31.10.02	absent	snared	adult
Solio Game Reserve	31.10.02	absent	snared	adult
Solio Game Reserve	1.11.02	absent	snared	adult
Total number poached 10				

Source: Kenya Wildlife Service, Rhino Programme, pers. comm. February 2003

Table 3. Number of known poaching incidents of white rhinos for Garamba National Park, Democratic Republic of Congo from 1998 to 2002

Approximate date poached	Horns present or absent	How killed	Age at death	Sex
January 1999	anterior absent*	shot by rifle	young adult	female
January 1999	?	?	juvenile	male?
April 2001	absent	shot by rifle	?	?

Source: Kes Hillman Smith, pers. comm. 18 February 2003

*Posterior recovered

second rhino was shot in the Kitich region of the Mathews Range.

In November 2001 at least four rhinos were killed in Tsavo East National Park (Tsavo's rhinos are all black). Kenya Wildlife Service (KWS) intelligence revealed the poachers were Somalis using mostly AK-47 guns. They removed all the horns. On 6 December, the KWS intelligence team arrested a Somali at the Nyali Beach Hotel in Mombasa with three fresh horns that may have been from these rhinos (KWS 2001; Opala 2001). In 2000 there was an acute shortage of rhino horn in Yemen. There was also a severe shortage of foreign exchange in Somalia with the closure of the al Barakaat banking facility in September 2001, resulting in the devaluation of the Somali shilling from 13,000 to 23,000 to one US dollar from September to November in Mogadishu (Wayne Long, head of UN security in Somalia, pers. comm. 3 February 2002). These two factors explain the added incentive for the Somalis to kill rhinos (Martin 2002).

A minimum of 14 rhinos were killed in 2002, the largest number in a single year since the 1980s. In January 2002 two were shot in Tsavo East, probably by Somalis. In May poachers snared two more black rhinos in Nakuru National Park using electric cables covered with dung, which were probably set specifically for rhinos (Anne Kahihia, senior warden, Lake Nakuru National Park, pers. comm. 9 February 2003). The rest were snared from August to November in Solio Game Reserve: four blacks and six whites. Two horns from a black rhino that died of disease in 2002 in Aberdare National Park were stolen.

From 1998 to 2002 Tanzania officially lost no rhinos to poachers (Mathew Maige, Tanzania Wildlife Division, pers. comm. May 2002). Rhinos, however, may have been poached in the Selous Game Reserve, one of the largest in Africa and where more rhinos remain than anywhere else in Tanzania. In this region, rhino carcasses decompose quite quickly with the high humidity and rainfall (Vigne and Martin 1997/8). Max Morgan-Davies recently surveyed the Selous extensively and recorded poaching camps specifically along the Ruaha River inside the reserve (Morgan-Davies, pers. comm. 12 April 2003). He concluded, 'Although no rhino carcasses have apparently been found in recent years [inside the Selous] . . . the large areas of dense evergreen thicket and riparian forests and inadequate ranger force . . . [make] the detection of carcasses on foot or from the air very difficult—particularly in the wet season. This could give the

Solio Ranch Ltd



Poachers use heavy wire cables to snare rhinos on Solio Game Reserve in Kenya, but not all those snared die, because sometimes Kenya Wildlife Service personnel find them in time to remove the wire cables.

false impression that there is no poaching' (Morgan-Davies 2001). On two occasions in the late 1990s in Dar es Salaam Morgan-Davies was offered a rhino horn for sale. He saw the horns, which were fresh, and according to the sellers, both were from Tanzania.

Another rhino population in the south-east of Tanzania was only recently rediscovered by a western scientist. In January 2001 he found a rhino skull with cut marks from a panga plus three elephant skulls and steel wire that had been used as a snare. Local people informed him that they could catch more rhinos if he wished (Conservation International via Tom Butynski, pers. comm. February 2003).

In the Democratic Republic of Congo it is known that three rhinos were poached between 1998 and 2002 (table 3). It is the only known population of northern white rhinos left in Africa. Since 1983 Kes Hillman Smith has been surveying DRC rhinos, which

are located in Garamba National Park. She believes that not all the poached carcasses have been found. The Garamba population has been stable for some time at around 30. There have been 10 births from 1998 to 2002 with no rhinos recorded dead from poaching. Therefore, perhaps an additional one or two rhinos have been poached annually in this five-year period with the horns usually stolen (Hillman Smith, pers. comm. 18 February 2003).

Information on the poachers

In Kenya there are two very different groups of rhino poachers: Somalis, who kill the animals using modern rifles, and Kenyans, who usually use wire snares. The two regions preferred by poachers have been Tsavo East National Park, nearly always Somalis, and Solio Game Reserve, mostly Kenyans from the area.

An average Somali gang infiltrating Tsavo consists of five or six men, one of whom may live locally and who knows the terrain of the park. The gang usually carries one or more guns, especially AK47s, an axe to remove the horns, various knives, water containers and food (maize meal, tea leaves and sugar). A businessman or the gang leader will give Kenya shillings (KES) 15,000–20,000 (USD 195–260) for

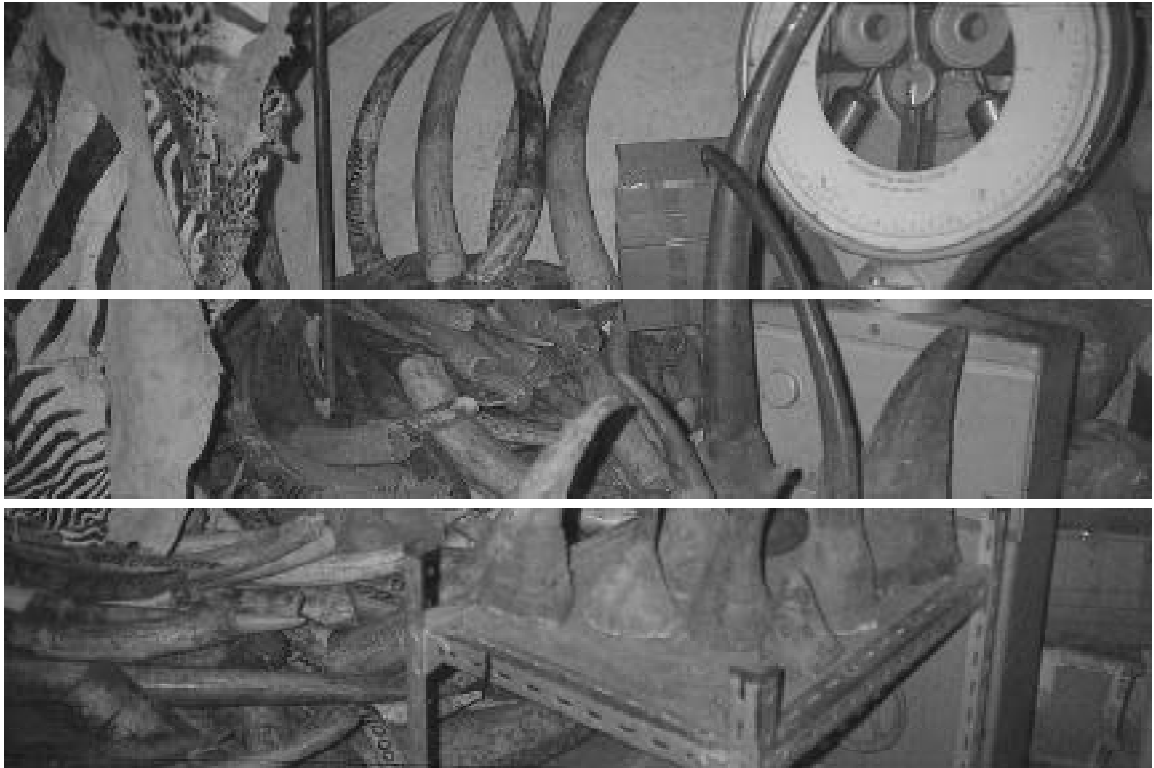
food and a porter, and to hire guns and ammunition. The gang may stay in the park for a couple of months searching for rhinos. Unlike ivory, which they often bury in the ground to conceal before taking out of the park, the poachers carry the horns directly out on foot. According to one confidential source who has worked in Tsavo East, one gang member, a porter, was arrested in the park in 2002 and admitted that he was promised KES 12,000–13,000 (USD 156–169) for two weeks' work inside the park and a week's travel time to and from his home. For comparison, the lowest monthly wage in Kenya is around USD 26 a month. This is the only recent payment that we know of for a poaching gang member in the three countries still trading rhino horn to Yemen.

Solio Game Reserve, a privately owned area of 7082 hectares near Mount Kenya, holds the largest population of rhinos in eastern Africa: 135, both black and white species. On its northern border is the road from Rumuruti to Naro Moru with small agricultural settlements on the other side of the road. This is the most vulnerable part of the reserve. In 2002, 10 rhinos were poached using snares, and it is thought that the same gang was involved in each incident, coming in from the north. The gang members climbed over or through the reserve's electric fence without cutting

Esmond Martin



A few of the wire snares on Solio Game Reserve were attached to logs.



Some of the rhino horns that were sent to Yemen may have been stolen from government stores in eastern Africa.

the wires. They brought heavy wire cables that they attached to trees or logs to snare the rhinos. Four rhinos were snared in August, but only two, according to KWS, died from their wounds. In October the gang returned and set up a camp, which was found after the gang had fled in November. The camp was situated near a derelict road as the poachers realized that no vehicle would come that way. The road has since been reopened. At the camp were clothes, tobacco, Coca Cola, sugar and maize meal, as well as more wire snares and probably firearms, which they never used, no doubt fearing the noise would attract attention. The poachers had placed all their snares in the northern part of the reserve. Black rhinos tended to get caught in the wire loop around their hindquarters while the larger white rhinos got caught around their necks. When the gang members found the snared rhinos, they removed only the horns and either buried the carcasses or hid them under bushes. In October and November nine rhinos were snared and only one survived. The poachers vanished suddenly. Later in November, 8 to 10 men of the KWS Special Operations Unit from Isiolo went to the reserve and found six wire snares

that had been set up. No more rhinos had been poached up to March 2003 as the unit stayed on inside the reserve (Edward Parfet, general manager, Solio Ranch Ltd., pers. comm. 14–16 March 2003).

The main problem has been that Solio had no anti-poaching team for years, only a group of five to six men who checked the 62-km electric fence around the reserve each day. Solio's general manager now plans to create an anti-poaching unit once more for greater protection. None of the poachers has yet been captured so Solio's general manager and KWS are not certain of their identity. Informants have suggested that Somalis have been behind the poaching gangs. Two Somalis who were dismissed from Solio's employment in 1998/9 may have found a market for Solio's horns through Somalis living in Isiolo. There is no doubt that Somali middlemen for the horns operate in and around Isiolo. The Somali connection with Solio is not new. In 1998 Somali poachers shot dead at least two white rhinos (Parfet, pers. comm. 14–16 March 2003).

In Tanzania, little information on rhino poachers is available. The Selous poachers are mostly from the surrounding areas. Few would be looking specifically for

rhinos, but if they found one, they would kill it (Benson Kibonde, chief warden of Selous in the late 1990s, pers. comm. 15 July 1997). In the dry season, poachers concentrate their efforts around waterholes, where they wait for rhinos and elephants to come to drink. Poachers are more efficient during the wet season when wildlife division patrols are less frequent in the Selous.

Results of law enforcement monitoring since 1992 show that 70 to 90% of the poachers in Garamba are Sudanese and often members of the Sudanese People's Liberation Army (SPLA). SPLA camps are located just to the north of Garamba across the border in Sudan, and SPLA personnel currently reside in the *domaine de chasse* (hunting reserve) to the east of Garamba as well. They have modern rifles and kill many mammal species in Garamba, primarily for meat, but elephants are killed also for their tusks (Martin and Hillman Smith 1999; Hillman Smith, pers. comm. 18 February 2003).

Trade routes through the Democratic Republic of Congo, Kenya and Tanzania

Several trade routes run from Tsavo East, mostly for rhino horns carried by Somali poachers or middlemen.

One is northwards to the Kenya–Somali coastal border town of Ras Kiamboni. The town is noted for smugglers, mostly Somalis and Arabs living in Somalia, and they handle many commodities (Wayne Long, pers. comm. 16 December 2002). The road north from here to southern Somalia's main town, Kismayu, which is on the coast, is in poor condition so some rhino horn is carried there by dhow. Rhino horn from Tsavo East is also known to be carried on foot to villages along the Somali border where it is sold for Somali shillings or US dollars. It is taken on foot north to the Ethiopian border as well. Some has been transported to the Kenyan towns and cities of Garissa, Mombasa and Nairobi, mostly by vehicle. The Solio rhino horn is also probably taken by vehicle to Nairobi.

In Tanzania, there are two main trade routes for rhino horn leaving the Selous. From the western and northern sides, the horns go to Morogoro and then by bus to Dar es Salaam where they are loaded aboard ship and transported to Zanzibar. From eastern and southern Selous, the horns go to the ports of Lindi or Kilwa Kivinje where traders put them into containers for palm oil for shipping to Zanzibar (Morgan-Davies, pers. comm. 12 April 2003). From southern Tanzania's newly

Esmond Martin



The Mocha area along the Red Sea coast of Yemen is the main point of entry for rhino horn for the market in Sanaa.

discovered rhino population, poachers say that they sometimes sell horn to Arabs who come to Iringa (Conservation International via Tom Butynski, pers. comm. February 2003). From there the horn probably goes to Dar es Salaam or Zanzibar.

In DRC, traders smuggle the horn from Garamba to Uganda or Sudan. There are two examples of this: A rhino horn was on sale in Maridi in southern Sudan in May 2001 and a trader offered a horn to a transporter in Kampala in central Uganda in June 2001. There have also been reports of rhino horn smuggled across the border into Uganda at Ariewara (Hillman-Smith, pers. comm. 18 February 2003).

There has been no official confiscation of rhino horn in DRC or in Tanzania recently, but there have been some confiscated in Kenya. From 1998 to 2002 there were 11 seizures of 32 rhino horns and pieces weighing 49.6 kg (KWS, pers. comm. 1 April 2003). Most of these (23 weighing 35.7 kg) were seized at exit points along the Kenya coast, especially Mombasa (17 weighing 26.2 kg) (KWS, pers. comm. 1 April 2003). Neither KWS nor the Kenya police, however, know the origin of most of them. Some horns may have originated outside the country, others could have been stolen from old government stockpiles, and a few may have been old horns only recently put on the market by private traders. So-called rhino horns that were well-made fakes may also have been included. Consequently, as we do not know the country of origin for these horns nor their ages, we are not including these data in our calculation on the maximum amount of new rhino horn that could have gone from Kenya to Yemen from 1998 to 2002.

Export prices for rhino horn out of eastern Africa

Prices for rhino horn are much higher than for ivory. Tusks from Kenya's elephants sold for an average of KES 1250 (USD 16) a kilogram in late 2001 on the Kenya–Tanzania border near Amboseli (Cynthia Moss, pers. comm. 8 February 2002). Traders on the Kenya–Ethiopia border received KES 2400 (USD 31) a kilogram in late 2002 and early 2003 (KWS, pers. comm. 25 February 2003). This means that tusks

Esmund Martin



Wastage in making rhino horn handles for jambiyas runs to over 60%. Large quantities of rhino horn chips and powder since the 1970s have been sent from Yemen to Chinese pharmaceutical factories.

weighing say 10 kg each from a poached elephant in 2002/3 would earn these traders USD 620. In 2002 rhino horns sold for around KES 40,000–50,000 or USD 519–650/kg for export from Nairobi or Mombasa. A black rhino carries about 3 kg of horn while a white rhino's horns together weigh around 5.5 kg so the export price in 2002 was about USD 1950 and USD 3575 for an average adult pair of horns from each species of rhino.

We have no recent prices for rhino horn exported from Tanzania or DRC.

Trade routes from Africa to Sanaa in Yemen

From Kenya rhino horns that are taken across the Kenya–Ethiopia border are moved by modern transport to Addis Ababa and then via Djibouti to Yemen. The horns that are smuggled out of Mombasa go by dhow or small cargo ship into Somalia to join other smuggled horn there or through Djibouti to Yemen or directly to the Yemeni coast. Although in the 1970s and 1980s rhino horns reached Yemen from

East Africa by air, today this is rare due to tightened security at the airport in Sanaa.

From the Tanzanian coast and from Zanzibar the horns are also transported by dhow or modern ship via Djibouti or directly to Yemen. There is no hard evidence on how DRC rhino horn is taken to Yemen, but it may go from southern Sudan to Khartoum and is possibly flown to Yemen, as it used to be, or it may be taken to Port Sudan and then moved by boat to Yemen. The DRC horn found in Kampala was probably intended to go through Kenya to Yemen.

When the horn arrives in Djibouti, its value rises to about USD 750 a kilogram. In early 2003, a Yemeni

trader offered up to USD 1000/kg for excellent rhino horn in Djibouti. Traders offering these prices are in Sanaa, but they have business connections in Djibouti. The port of Djibouti supplies many goods to Yemen, including other illegal ones, especially alcohol. As it is essentially not allowed in Yemen, there is a big illicit trade in beer, gin, vodka and whisky. Most of it is transported in dhows called *zarooks*, which can land elusively on beaches or in very shallow waters, unlike modern ships that require ports for docking and unloading cargo, and where Customs officers and other officials are located. Traders smuggle rhino horns in these dhows among the boxes of alcohol. They usually

land in the quiet waters around Mocha opposite Djibouti. Truck drivers take the cargo by road via Taiz to Sanaa. There are roadblocks along this route, and payments are required to clear them. Transport charges are thus greatly inflated, reflected in the higher price of alcohol in Sanaa. In January 2003 a can of beer cost retail USD 0.60 in Mocha, USD 1 in Taiz and USD 3.85 in Sanaa. A bottle of whisky cost retail USD 4.95 in Mocha, USD 6.59 in Taiz and USD 13.74 in the capital. The price increase for rhino horn sold in Sanaa is not so great, being a tiny addition to the main illicit cargo. In late 2002 the main jambiya trading family in Sanaa, who probably handles over three-quarters of the new rhino horn, offered about USD 1200/kg depending on quality and size, for horn brought to Sanaa.

The jambiya business in Sanaa

Number of workshops and craftsmen

In a survey in January 2003 we counted 70 active workshops with 102 craftsmen working on jambiyas. The numbers were almost the same as for our

Lucy Vigne



Jambiyas with rhino horn handles, both old and new, can be found openly on sale in Sanaa.



Compared with the 1970s and early 1980s few jambiyas with rhino horn handles are being made; instead, several hundred thousand are manufactured with water buffalo horn handles and offered for retail sale for an average price of only USD 15.

previous survey two years earlier (Vigne and Martin 2001). Overall, the number of workshops and craftsmen has increased since the early 1980s, primarily because of the big annual increase (about 3.8%) in the population (Vigne and Martin 2001). We did find that although some of the basement workshops had closed down and are now used as storerooms, four new workshops with seven craftsmen had recently opened in the retail jambiya sheath and belt section of the souk.

The making of jambiya handles

Craftsmen use new rhino horn for handles in Sanaa only, but new handles are being made of other materials and repairs are being carried out elsewhere in Yemen, especially in Dhamar, Sadah and Taiz (Vigne and Martin 2001). In early 2001, for the first time since 1978, we saw no new rhino horn handles being made in the main market in Sanaa, and in January 2003 we did not see any either. We believe, because the government has taken a stricter position

on this illegal activity by occasionally inspecting the souk, the craftsmen are probably filing the new rhino horn handles at home and bringing in the semi-finished or completed handles to the souk.

The number of handles being made out of new rhino horn is small because so little new horn is available. From 1998 to 2002 we estimated the annual minimum number of adult rhinos that had had their horns stolen was 3.5 (2.6 black and 0.9 white) in Kenya, 2 black in Tanzania and 2 white in DRC. The total for this period was 23 black and 14–15 white. (This excludes one black rhino calf with very small horns taken in Kenya.) If these figures are multiplied by 3 and 5.5 kg respectively for the weight of the average adult black and white rhino horns, it gives the maximum potential amount of new horn that could have reached Yemen: 30 kg on average per year from 1998 to 2002.

A kilogram of raw rhino horn makes about three handles at present. The average size of a new rhino horn handle is smaller than in the past when horn was more abundant and when the Yemen economy was much stronger. Therefore, from 1998 to 2002 a

maximum of 90 jambiyas with new rhino horn handles could have been made per year in Yemen. This is a tiny amount compared with the peak period of 1969 to 1977 when 8750 rhino horn handles on average were produced each year (Martin et al. 1997). The main material used is water buffalo horn imported from India. In the late 1990s craftsmen in Sanaa made about 300,000 jambiyas per year with water buffalo horn handles (Vigne and Martin 2001).

Prices of jambiyas

The retail prices quoted below were collected in January 2003. They are for the jambiya alone, not including the sheath and belt, which are bought separately.

Retail prices for new rhino horn jambiyas are quite low taking into consideration the cost of the rhino horn. On average, small ones sold for USD 255, medium-size ones for USD 446 and large ones for USD 824 (table 4). These prices in US dollars are about the same as in our surveys of 2001 and 1999. How can traders make a reasonable profit by selling them at such low prices? There are two main ways. The family in Sanaa that buys nearly all the raw rhino horn makes most of the handles and also sells them retail, thus avoiding a middleman. Secondly, the family sells the horn chips and powder that are left over from the handle-making process. Eastern Asians buy these shavings when visiting Sanaa for about USD 500 a kilogram to smuggle out of Yemen and into eastern Asian countries for medicinal use. The family sometimes buys the left-over horn shavings for USD 400 from other craftsmen and sells them to their eastern Asian contacts; thus they can make USD 100 a kilogram on such a transaction. In summary, those making and trading jambiyas with new rhino horn handles only break even nowadays on their retail sales (excluding their small overheads) and thus make most of their profit from selling the left-over horn chips and powder later.

Water buffalo horn handles make up almost 90% of all the materials used. Well-made handles look quite similar to those of rhino horn and this is a reason they are so popular. The other reason is that they are very cheap. New ones range from USD 2.75 to USD 66 with an average of USD 15.03. These prices have remained roughly the same since 1986 (Vigne and Martin 2001). In Yemeni rials, however, there has been a large price increase because of a major currency devaluation from 9.7 in 1986 to 182 in early 2003 for one US dollar.

The other main materials used to make handles are wood, which ranges in price from USD 2.20 to USD 10.90 with an average of USD 5.26 per handle, and amber, which ranges from USD 20 to USD 30 averaging USD 24.37 per handle. In earlier surveys we saw jambiyas with handles from camel nail and plastic for sale; we did not see them on this survey.

Conservation strategies to reduce demand for new rhino horn

Law enforcement and CITES

In 1982 Yemen banned the import of new rhino horn. In 1987 the government banned the re-export of rhino horn (in the form of left-over chips and shavings). In 1992 the sale of rhino horn in its raw form within Yemen was made illegal and all rhino horn in Yemen had to be declared to the Ministry of Supply and Trade. Any material not reported was to be confiscated with legal action taken, but there were no penalties mentioned, inspections in the souk were infrequent and ineffective, and confiscations in Yemen were very rare. The efforts to stop imports and exports of rhino horn were also inadequate.

After much deliberation Yemen finally joined CITES in 1997. The government did not implement the convention requirements properly, and it failed to answer correspondence from CITES in 2000 and 2001

Table 4. Retail prices for newly made jambiyas with rhino horn handles in Sanaa in January 2003

Size	Range in rials	Range in US dollars	Average in rials	Average in US dollars
Small	25–85,000	137–467	46,333	255
Medium	50–120,000	274–659	81,111	446
Large	90–250,000	495–1374	150,000	824

Source: Survey carried out by Esmond Martin and Lucy Vigne in Sanaa
USD 1 = 182 Yemeni rials

to rectify these problems. On 14 January 2002 the CITES Secretariat, consequently, informed 'the Parties that, pursuant to decision 11.16, the Conference of the Parties recommends that, from the date of this Notification, all Parties should refuse any import from and export or re-export to Yemen of specimens of CITES' listed species until further notice' (CITES 2002a). Thus, Yemen enacted the Prime Minister's Resolution No. (104) on 16 April 2002 regarding the protection and regulation of trade in endangered species, including penalties (Yemen 2002a). In 2002 the government also designated a scientific committee consisting of members of the University of Sanaa and established a provision for the confiscation of specimens that are illegally traded or possessed. As a result, on 4 October 2002 the CITES Secretariat informed the Parties that the recommendation to suspend trade was withdrawn with immediate effect (CITES 2002b).

Since 2001 Yemen has placed high priority on environmental issues in general. In June 2001 the government's former Environment Protection Council was upgraded to become the Environment Protection Authority (EPA). It is placed under the Ministry of Tourism and Environment with the minister representing the EPA in the cabinet. The EPA has more and better-qualified personnel than formerly and has been given more responsibility.

Although the EPA has now organized its enforcement methods to stop the rhino horn trade, in 2002 it had only occasionally and superficially inspected the souk and found no new rhino horn pieces. To make these inspections more thorough, officials, especially the Customs officers and the police, need training to identify products from endangered species. The CITES Management Unit within the EPA has requested training also on the administrative work that CITES requires. Either TRAFFIC or the CITES Secretariat should treat organizing such training as a priority. When we met with the British ambassador, she said that she would try to support a training course for CITES and Customs officers. We discussed these points in detail with the EPA chair. We also discussed the need to check the officially registered stockpiles of rhino horn.

Further efforts to control rhino horn trade are still needed. Since the main entry point for rhino horn is around Mocha, the EPA should consider setting up an informant system in this area. There should also be official cooperation with the Djibouti authorities.

Discouraging the use of new rhino horn

An important strategy used to conserve the rhino populations of eastern Africa has been to encourage consumers in Yemen to buy new jambiyas that are not made from rhino horn. Compared with the early 1980s the supply of rhino horn coming into the country from 1993 to 2002 has decreased by almost 95%, but the price in US dollars has stayed the same. Considering inflation, the price of rhino horn has fallen significantly in US dollars in Yemen over this period. Demand has fallen sharply because far fewer customers nowadays are buying jambiyas with new rhino horn handles, preferring alternative cheaper ones on the market such as jambiyas with handles made from water buffalo horn. This decline in demand also is directly related to the poor state of Yemen's economy. From 1990 to 1998, according to official government statistics, the per capita annual income fell from USD 701 to USD 359 (Yemen 2000b). If, however, the economy of Yemen were to expand considerably once more, due probably to increased remittances and more oil discoveries in Yemen, then many more Yemenis would choose to buy jambiyas with new rhino horn handles. This would push up prices, putting more pressure on the rhinos.

In January 2003 we continued our ongoing public awareness efforts to stop people from buying new rhino horn jambiyas. We produced a coloured poster with a large picture of a jambiya with a rhino horn handle and pictures of a dead and a live rhino urging in the Arabic language that rhinos not be killed for the sake of a jambiya and that they should be allowed to live. These were distributed to schools, the Sanaa Zoo, along main roads, in the souks of Aden, Manaka and Sanaa's old town where some of the jambiya craftsmen complained that the poster would damage their livelihood. We also distributed wildlife posters and rhino postcards. We gave a copy of the WWF rhino film in Arabic (which we had made several years earlier) for reshewing, this time on a large cinema screen in towns around Yemen. We had discussions with various senior officials in the government and in the ruling political party (the General People's Congress). These included the minister of Tourism and Environment, the secretary general of the ruling party and the mayor of Sanaa, to give a higher priority to helping conserve rhinos by encouraging Yemenis not to buy jambiyas with new rhino horn handles.

One important requirement that still remains is to find an acceptable substitute for new rhino horn handles

that is of similar price and prestige. We have encouraged in the past the use of locally mined semi-precious stones such as agate and jasper. Although they have been used in Yemeni jewellery for hundreds of years, they have not become popular for handles. Customers find them too heavy, and they break if dropped on a stone floor. They are also over four times more expensive than the average new rhino horn jambiya. Consumer research is required to see if customers will buy expensive handles made out of gold and silver, which formerly were popular, or to try to introduce new materials such as agarwood (*Aquilaria* spp.), which is popular as an incense in the Arab world.

The lack of funding has been the main problem in moving forward on investigating and promoting substitutes for rhino horn. We, and unfortunately no one else, visit Yemen to work on these issues for only a couple of weeks about every two years because funds for more regular visits are lacking—a highly unsatisfactory situation. Furthermore, there are no NGOs in Yemen to support the government on the rhino horn issue. Funding for a Yemeni person is desperately needed for the follow-up work required, such as communicating with the EPA, other agencies and individuals.

Conclusion

To conserve the rhinos in eastern Africa better, it is important to improve the implementation of two main strategies: anti-poaching and trade reduction. Firstly, greater emphasis needs to be put on protecting the rhinos in the national parks and reserves and on private land. This means more money for employing capable and motivated guards to patrol these areas, and more resources for intelligence-gathering networks to arrest poachers and middlemen. The second strategy, which is at least as important, is to encourage Yemenis further to buy jambiyas with handles that are not made of new rhino horn. Yemenis much prefer, if they have the money, the more prestigious and more attractive antique jambiyas with rhino horn handles. If adequate resources are allocated to these two strategies, then the future for rhinos in eastern Africa is favourable.

Acknowledgements

We would like to thank the following conservation organizations for supporting financially our fieldwork

in Yemen in January 2003: Save the Rhino International, Columbus Zoo, and an anonymous donor. We are especially grateful to Kes Hillman Smith, Max Morgan-Davies, Edward Parfet and officers of the Kenya Wildlife Service (notably Martin Mulama), and in Yemen to Abdul Karim al-Iryani and several other people for supplying us with relevant information and help.

References

- Anon. 2002. African rhino numbers continue to increase. *Pachyderm* 33:103–105.
- CITES. 2002a. Notification to the Parties. Yemen. Recommendation to suspend trade. No. 2002/005, 14 January.
- CITES. 2002b. Notification to the Parties. Yemen. Withdrawal of the recommendation to suspend trade. No. 2002/057, 4 October.
- [KWS] Kenya Wildlife Service. 2001. Rhino horns recovered in Mombasa. KWS press release, 7 December.
- Martin, E.B. 2002. Horn thieves return. *BBC Wildlife* 20(2):28–29.
- Martin, E.B., Vigne, L., and Allen, C. 1997. *On a knife's edge: the rhinoceros horn trade in Yemen*. TRAFFIC International, Cambridge.
- Martin, E., and Hillman Smith, K. 1999. Entrepôts for rhino horn in Khartoum and Cairo threaten Garamba's white rhino population. *Pachyderm* 27:76–85.
- Morgan-Davies, M. 2001. Survey and conservation status of five black rhino (*Diceros bicornis minor*) populations in the Selous Game Reserve, Tanzania, 1997–1999. *Pachyderm* 31:21–35.
- Opala, K. 2001. Rhino horns seized as poaching fears mount. *Saturday Nation* (Nairobi), 8 December 2001.
- Vigne, L., and Martin, E. 1997/98. Safari: Sand Rivers (Tanzania's Selous Game Reserve). *Swara* 20(6) and 21(1):8–11.
- Vigne, L., and Martin, E. 2001. Closing down the illegal trade in rhino horn in Yemen. *Pachyderm* 30:87–95.
- Yemen, Republic of. Council of Ministers. 2002a. Prime Minister's Resolution No. (104) for the year 2002 regarding the protection of endangered species of wild fauna and flora and the regulation of its trade, 16 April.
- Yemen, Republic of. Ministry of Planning and Development, Central Statistical Organization. 2002b. *Statistical Year-Book* 2001:442.