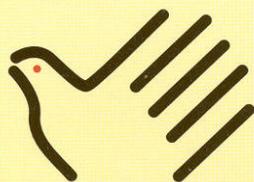


SADC REGIONAL PROGRAMME FOR RHINO CONSERVATION

Economic Analysis of Rhino Conservation in a Land-Use Context within the SADC region

Anna Spenceley and Jon Barnes

September 2005
SADC RPRC Task 6.3-1.2 (Phase II)



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- The Secretariat of the Southern Africa Development Community (SADC)
- IUCN-ROSA (The World Conservation Union - Regional Office for Southern Africa)
- The IUCN African Rhino Specialist Group
- WWF-SARPO - (World Wide Fund for Nature - Southern Africa Regional Programme Office)
- CESVI (Cooperazione e Sviluppo)

The **Programme goal** is to contribute to maintain viable and well distributed metapopulations of Southern African rhino taxa as flagship species for biodiversity conservation within the SADC region.

The **Programme objective** is to implement a pragmatic regional rhino strategy within the SADC region following the acquisition of sound information on, firstly, the constraints and opportunities for rhino conservation within each range state and secondly, the constraints and opportunities for rhino metapopulation management at the regional level.

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CONTENTS

1.	Executive summary	3
2.	Introduction	6
3.	Methodology.....	10
4.	The Added value of rhinos to existing wildlife operations in state and private areas.....	11
4.1	State protected areas.....	12
4.2	Private protected areas	18
5.	How protection and monitoring of rhino affects other wildlife	22
6.	The impact of rhino on community-based tourism and local livelihoods.....	25
7.	The extent to which rhino influence change of land use to wildlife production.....	39
8.	Discussion	43
8.1	Do rhino add value to wildlife operations in state and private areas?.....	43
8.2	Does the protection and monitoring needs of rhino confer blanket protection for other wildlife components? 45	
8.3	Do rhino contribute to community-based tourism and rural livelihoods?.....	46
8.4	Have rhino catalysed the change of land use from livestock to wildlife?	47
8.5	Implications of consumptive and non-consumptive uses of rhino within the SADC region.....	47
9.	References	48
10.	Appendix 1: Questionnaire for tourist guides	52
11.	Appendix 2: Inflation and exchange rates used for constant 2004 values	53

Tables

Table 1:	Numbers of white and black rhino in Africa as of 31 December 2003 by country and subspecies	7
Table 2:	Financial and economic values attributable to full use of black rhino in the Torra community conservancy investment, Namibia dollars (N\$), 2004.....	33
Table 3:	Financial and economic values attributable to the introduction and full use of black rhino in the Puros community conservancy investment, Namibia dollars (N\$), 2004.....	34
Table 4:	Financial and economic values attributable to black rhino in trophy hunting joint ventures, Torra and Puros conservancies, Namibia dollars (N\$), 2004.....	35
Table 5:	Financial and economic values attributable to black rhino in two wildlife viewing lodge joint ventures, Torra and Puros conservancies, Namibia dollars (N\$), 2004.....	36
Table 6:	Total of all financial and economic values attributable to full use of black rhino in the Torra conservancy, Namibia dollars (N\$), 2004	37
Table 7:	Total of all financial and economic values attributable to establishment and full use of black rhino in the Puros conservancy, Namibia dollars (N\$), 2004	38
Table 8:	Total incremental operating costs (Z\$) associated with rhino conservation (Nominal data)	42

Figures

Figure 1:	Real turnover from white and black rhino sales at KwaZulu-Natal Game Auctions (2000-2005)	9
Figure 2:	Average real price of white and black rhino sales at KwaZulu-Natal Game Auctions (2000-2005).....	9
Figure 3:	Black rhino population in Hluhluwe-Imfolozi (1989-2004).....	12
Figure 4:	White rhino population in Hluhluwe-Imfolozi (1973-2004)	13
Figure 5:	Black and white rhino sold and donated from Hluhluwe-Imfolozi (2000-2005).....	13
Figure 6:	Average real purchase price for Hluhluwe-Imfolozi's rhino at auction sales (2000-2005)	14
Figure 7:	Total real turnover for Hluhluwe-Imfolozi's rhino sold at auction sales (2000-2005)	15
Figure 8:	Average real rhino capture cost in Hluhluwe-Imfolozi (2000-2005).....	16
Figure 9:	Animals that visitors to Hluhluwe-Imfolozi wanted to see (n=153).....	17
Figure 10:	Total real waived turnover from donated rhino (2000-2005)	18
Figure 11:	Poaching incidents in Hluhluwe (all species) (1999-2005)	23
Figure 12:	Species poached in Hluhluwe (2002/3)	24
Figure 13:	Real budgets for Hluhluwe-Imfolozi (2000-2005)	24
Figure 14:	Real conservancy and household income to the Torra conservancy (1999-2004).....	27
Figure 15:	Real conservancy and household income to the Puros conservancy (1999-2004).....	28
Figure 16:	Total real financial benefit to Torra and Puros conservancies (1999-2004).....	29
Figure 17:	Number of jobs in Torra and Puros	29
Figure 18:	Total real turnover for Hluhluwe-Imfolozi's rhino sales compared with total park expenditure (2000/1-2004/5).....	43

1. EXECUTIVE SUMMARY

In December 2004 IUCN Regional Office for Southern Africa commissioned an economic analysis of rhino conservation in southern Africa. The aim of the analysis was to explore the rationale for regarding rhino as "flagship species" in terms of:

- The extent to which they might "add value" to existing wildlife operations in state and private areas;
- The extent to which their protection and monitoring needs might confer blanket protection for other wildlife components that might be vulnerable to human pressures (notably poaching, and including the converse possibility, that rhino may attract poachers into an area where other wildlife is then poached);
- The extent to which they might contribute to community-based tourism and thereby to rural livelihoods, including comment on the opportunities for "direct incentives" payments to landholders or communities who ensure breeding opportunities for this species;
- The extent to which, in view of the above, they might be catalytic to land-use changes that entail a move towards wildlife production from alternative land-uses such as livestock production.

Economic analyses were to concentrate on market values of relevant goods and services rather than non-use values, and to outline the issues and implications of consumptive uses of rhino within the SADC region.

The analysis was essentially a pilot study that was designed to achieve an initial general insight into economic issues surrounding black and white rhino in southern Africa. Therefore rather than providing a comparative analysis between sites, or longitudinal evaluations, the study is largely descriptive for one or two case study sites within each part of the analysis. Where the availability of data has allowed, economic scenario analyses have been performed to generate realistic predictions for revenue generation in the future for enterprises and reserves that support rhino populations. In addition to presenting economic data regarding rhino around southern Africa, the discussion attempts to outline the issues and implications of consumptive and non-consumptive use of rhinos within the SADC region.

The study considered whether rhino added value to wildlife operations in state and private areas by evaluating revenue generating activities and costs associated with rhino in South Africa and Namibia. Hluhluwe-Imfolozi, a park run by the provincial conservation authority KwaZulu Natal Wildlife in South Africa, generates revenue by auctioning wildlife including live rhino. On average, between 2000 and 2005 these sales raised the equivalent of 60% of the park's conservation budget. However, this revenue does not accrue directly to the park, but enters the conservation authority's central budget. By contrast, Phinda is a private reserve in South Africa that has generated a net financial benefit of US\$221,041¹ through live sales of white rhino since 2002. Tourists at Phinda can participate in white rhino darting activities, and their fees are used to finance the process of inserting identification chips into their horns. Palmwag is a private sector enterprise in Namibia where the central attraction for visitors is tracking desert rhino. This tourism experience directly finances conservation and monitoring activities undertaken by the Save the Rhino Trust, and is essentially the reason for the lodge's existence. The evaluation concluded that both black and white rhino provide a net benefit to both state and private protected areas through both consumptive and non-consumptive use.

¹ Constant 2004 US\$ values. Note that where possible values have been converted to constant 2004 US\$ values to facilitate comparisons over time. Appendix 2 contains the exchange rates and inflation multipliers that were applied throughout this report. Where values have not been changed these are indicated as nominal values.

Conservation managers at Hluhluwe-Imfolozi reported that the protection and monitoring requirements of rhino was integral to the protection and monitoring of other species, because conservation was focussed on the integrity of the reserve, rather than any particular species. However, 67% of the conservation staff of Hluhluwe-Imfolozi live in communities within 20-30 km of the park, which may have positive implications for the protection of rhino and other wildlife species.

A detailed economic and financial analysis of the value of rhino in the Torra and Puros conservancies in arid western Namibia revealed that, in addition to current benefits from rhino tourism, it would be possible to generate very significant new community benefits from the rhino, through hunting of black rhino (as part of the new CITES allocation), live sales and guided rhino tracking. In Torra, which already has a black rhino population, rhino can contribute more than half of the annual community income from wildlife and tourism. Rhino can contribute annual local community income amounting to N\$2.70 (US\$0.43²) per hectare. The annual economic contribution of rhino to the GDP could be N\$3.78 (US\$0.60³) per hectare. In Puros, which currently has almost no rhino, positive rhino values would be possible, but initially these would be much less, due to the need to invest capital in rhino establishment. Evaluations of the attitudes and perceptions of people living in conservancies near Torra (#Khoadi-//Hoas, //Huab and Omatendeka) certainly indicate a general support for economic activities based on rhino, and for their re-introduction into areas of their historical range. Comparative evidence suggests that more productive (semi arid and sub-humid) environments, in Zimbabwe and KwaZulu-Natal, could have rhino values per hectare roughly four to eight times higher, than those measured in arid Namibia.

Considering the development of conservancies in Namibia and Zimbabwe, rhino have played a pivotal role in motivating land-use change. In Namibia the community-based natural resource management program embraces a major portion of all communal lands in the country, so that large areas are now allocated to wildlife uses, alongside livestock. In Zimbabwe financial benefits associated with the presence of rhino on private land catalysed the change in use from livestock to wildlife. A series of factors combined to bring about this change, which included an enabling political environment and legislation, support by WWF and appropriate financial assistance, the unsuitability of the habitat for livestock production and co-operation between neighbouring landowners.

Both consumptive and non-consumptive uses of rhino have the potential to generate significant amounts of economic income and to contribute to the livelihoods of rural people. As land uses, they tend to be complementary and not mutually exclusive. This and other studies have shown that combinations of both non-consumptive and consumptive uses will generate maximum benefits. To provide the incentives needed for massive investment in rhino conservation, all possible uses should be explored for rhino.

² Constant 2004 US\$ values.

³ Constant 2004 US\$ values.

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2. INTRODUCTION

Four subspecies of rhinoceros are present in southern Africa: the South-western, South-central and Eastern black rhino and the Southern white rhino. Significant populations of the South-western black rhinoceros (*Diceros bicornis bicornis*) have been conserved in the desert and arid savannah areas of Namibia, and populations have been re-established in other areas of Namibia and south-western South Africa. The South-central black rhinoceros (*D. b. minor*) is the most numerous of the black rhino subspecies, and has strong populations in South Africa and to a lesser extent Zimbabwe, with smaller numbers in Swaziland, Tanzania, Malawi, Botswana and Zambia (Emslie and Brooks, 1999; AfRSG, 2004). The Eastern black rhinoceros (*D. b. michaeli*) is present in northern Tanzania and South Africa (pers. comm. R. Emslie, 2005; AfRSG, 2004). South Africa is also the stronghold of the Southern white rhino (*Ceratotherium simum simum*), while much smaller reintroduced populations occur within its former range in Botswana, Namibia, Swaziland, Mozambique and Zimbabwe, and outside their historical range in Zambia (Emslie and Brooks, 1999; AfRSG, 2004).

According to the IUCN 2004 *Red List of Threatened Animals*, the South-central and Eastern black rhino are classified as Threatened-Critically Endangered, while the South-western black rhino has Threatened-Vulnerable status (IUCN, 2004). Although in the 1960s it was estimated that over 100,000 black rhino were still roaming Africa, a combination of poaching and inadequate field protection has decimated populations to around 3600 in 2003 (Emslie and Brooks, 1999; IUCN SSC AfRSG, 2003) (see Table 1). Poaching pressure escalated during the 1970s and 1980s as a result of the rising demand for rhino horn in Asia and the Middle East. Economic and political instability in a number of rhino range states gave commercial poachers the freedom to hunt rhino with little chance of being caught, and between 1970 and 1992, there was a 96% reduction in black rhino numbers. The decline has eased recently, and some of the most effectively protected and managed populations have shown healthy increases. Although some believe that the increases are due to good levels of protection within small areas, others suggest that international and domestic bans on trade in illegal rhino horn are starting to work.. The only two countries that showed a net increase in black rhino numbers between 1980 and 1997 were South Africa and Namibia, which made large investments monitoring and law enforcement. Although they only had 6% (930) of Africa's black rhino in 1980, in 2003 this had increased to 70% (2524) (Emslie and Brooks, 1999; IUCN SSC AfRSG, 2003). The south-central black rhino is now the most numerous sub-species, although there are only an estimated 1,770 remaining (IUCN SSC AfRSG, 2003) (see Table 1).

The southern white rhino was rescued from near extinction a century ago. Numbers were decimated by rhino hunting for sport and meat by Europeans, and also through the killing of rhino areas being opened up for agriculture (Emslie and Brooks, 1999). From a single population of barely 20 animals in 1885 (Emslie and Brooks, 1999) in the area that is now the Hluhluwe-Imfolozi Park in South Africa ('t sasRolfes, 1996) there were more than 1,802 in 2002 (KZN Wildlife/Earthwatch Institute). The recovery of the population was due to the protection and subsequent growth of the Hluhluwe population, and in 1961 surplus animals were routinely translocated from the Park to establish new populations (Player, 1972). "Operation Rhino", as it was known, re-introduced rhino to areas of their former range ('t sasRolfes, 1996) and South Africa hosts 93% of this population (IUCN SSC AfRSG, 2003). Numbers have continued to increase in the wild, and the white rhino is now classified as Near Threatened (IUCN, 2004). The *in situ* population in southern Africa of some 650 animals in 1960 increased to 11,120 in 2003 ('t sasRolfes, 1996; IUCN SSC AfRSG, 2003).

Table 1: Numbers of white and black rhino in Africa as of 31 December 2003 by country and subspecies

Species	White rhino				Black rhino						
	Subspecies	C.s.cottoni (northern)	C.s.simum (southern)	Total	Trend	D.b.bicornis (south-western)	D.b.longipes (western)	D.b.michaeli (eastern)	D.b.minor (southern-central)	Total	Trend
Botswana			67	67	Up+Intro				5	5	Intro
Cameroon							5?			5?	?
DR Congo	22		22	22	Down						
Ethiopia								4 D.b.bruceii?		4	?
Kenya		218	218	218	Up			437		437	Up
Malawi									8	8	Up+Intro
Mozambique		2	2	2	?				0?	0	Extinct?
Namibia		186	186	186	Up	1,238				1,238	Up
Rwanda								1		1	Down
South Africa		10,306	10,306	10,306	Up*	71		36	1179	1,286	Up
Swaziland		61	61	61	Up				15	15	Up
Tanzania								42	24	66	Up
Zambia		3	3	3	Down				5	5	Intro
Zimbabwe		250	250	250	Up				536	536	Up
Totals	22	11,090	11,120	11,120	Up*	1,310	5?	520	1,770	3,610	Up

Table excludes speculative guesstimates

Numbers primarily compiled at (SADC RPRC and WWF funded) IUCN SSC AfrSG Meeting held in Kenya 6-11 June 2004

Numbers of *D.b.minor* in Tanzania, *D.b.bicornis* in Namibia, *D.b.longipes* in Cameroon and *C.cottoni* in DRC may be higher but this requires confirmation.

White rhino trend is up but numbers down due to sampling error associated with estimate for largest population of southern white rhino (Kruger NP).

The numbers of southern white rhinos outside Kruger has increased by 606 (+10%) over the last 2 years and there is no evidence of an actual decline in Kruger.

Subspecies totals >500 rounded to nearest 10 rhino.

Exact Swaziland numbers of *D.b.minor* given to AfrSG but are being kept confidential until authority is obtained to release them. In the meantime the table shows an approximation to the true number.

Source: IUCN SSC African Rhino Specialist Group, 2004

Internal threats that arise within rhino's range states include wars, poverty, rising protection costs, declining conservation budgets, varying attitudes of politicians and local communities to conservation and land claims. These threats both improve opportunities for poachers to kill rhino without being caught and also entice more people towards poaching because of the financial returns. Reduced conservation management budgets mean that there are insufficient field rangers available to effectively monitor and protect rhino (Emslie and Brooks, 1999). In 1999 the head of the IUCN Species Survival Commission, Simon Stuart stated that African conservation agencies could become self-sufficient by "... *developing strategies where revenue raised from the sustainable use of rhinos can be used to offset their high conservation cost*" (Emslie and Brooks, 1999: v). Self-sufficiency is important, and in South Africa, it has been estimated that a park of 500 km² needs to spend about US\$1,000 / km² per year to control poaching (Conway *in litt.*, Herbst and Emslie *in litt.*)⁴

The demand for rhino horn has been primarily responsible for the decline in rhino numbers globally. Despite international legislation and domestic bans on trade in rhino horn, rhino are still under threat from poachers who believe they can make money easily from their horn (Emslie and Brooks, 1999). The two main uses of rhino horn are *medicinal* (as an ingredient in traditional Chinese medicine) and *ornamental* (as highly prized material for making handles of *jambiyas* - ceremonial curved daggers worn in some Middle East countries). Some consider that inflated reports regarding the market value for Asian rhino horn are encouraging speculative poaching in Africa, while there are indications from South African police reports that black rhino horn is worth

⁴ At nominal prices

R7,530 (US\$1,215) per kg (Swanepoel 1996)⁵. However, Emslie and Brooks (1999) point out that if dealers received between US\$100 – 625 for each rhino horn⁶, that this is only a small percentage of the value that live rhino fetch at auctions (Figure 2). It is considered highly unlikely, for political reasons, that legal sale of rhino horn will be permitted in the near future, and this has been left out of our analysis of possible uses for rhino.

Approaches for trading live wildlife in South Africa include game auctions (with live and catalogue auctions); independent sales made by game capture companies; and private individuals negotiating deals. Live game auctions tend to sell higher quality and scarcer animals, while in catalogues buyers can request certain ages and sex ratio of animals, but do not physically inspect their purchases before delivery (Scriven and Eloff, 2003). Auctioneering companies advertise the live sale event and wildlife on offer, and base their commission on the auction turnover with additional charges paid by game farmers to game capture companies to transport their purchases (ibid).

During the 1990's the Natal Parks Board (NPB) (which became KwaZulu Natal Wildlife) experiences of selling white rhino to the private sector were not successful for conservation. Prospective buyers registered on a waiting list, and the rhino were sold on a first come, first serve basis. The price was set by the NPB (R9,900 in 1980⁷), and was significantly less than the price obtained from trophy hunters (R64,350⁸). This led to landowners purchasing rhino and then selling them on for trophies rather than to breed them. The waiting list grew dramatically during the 1980s as the demand for trophies increased, and NPB increased the set price. However, during the first public game auction in 1986 black rhino were sold for R47,600⁹. This led to NPB holding its own auction in 1987 and obtaining almost R63,150 per rhino¹⁰. Once auctioning was introduced as a pricing mechanism the purchasing price rose and private landowners had the incentive to breed their own rhino populations (Rolfes, 1996).

At the KZN Wildlife Game Auctions in 2003 generated the highest real turnover between 2000 and 2005. During that year eighty-three white rhino drawn from reserves across the province were sold for a total of US\$1,538,599 (average price of \$18,537)¹¹. That same year six black rhino were sold for a total of \$361,897 (average price of \$60,316)¹² (pers. Comm. R. Devduth, 2005). Figure 1 shows that the real turnover from sales of white rhino by far exceeded the turnover from black rhino, and that none were sold in 2002 or 2005. In 2005 rather than being sold, a population of black rhino were donated to Phinda (see section 4.1.2).

Emslie and Brooks (1999) reported that the annual turnover from all game sales from the Hluhluwe-Umfolozi Park represented 22% of the total cost of running the Park in 1998/99¹³ and that rhino sales contributed a high proportion of this revenue. In 2001 boma and catalogue auctions by KZN Wildlife generated 15% of the organization's management costs (Scriven and Eloff, 2003).

⁵ At nominal prices

⁶ At nominal prices

⁷ In constant 2004 values

⁸ In constant 2004 values

⁹ In constant 2004 values

¹⁰ In constant 2004 values

¹¹ In constant 2004 values

¹² In constant 2004 values

¹³ This calculation included the cost of repaying loans for building Hilltop camp and a tarred road through the reserve (pers. comm. R. Emslie, 2005).

Figure 1: Real turnover from white and black rhino sales at KwaZulu-Natal Game Auctions (2000-2005)

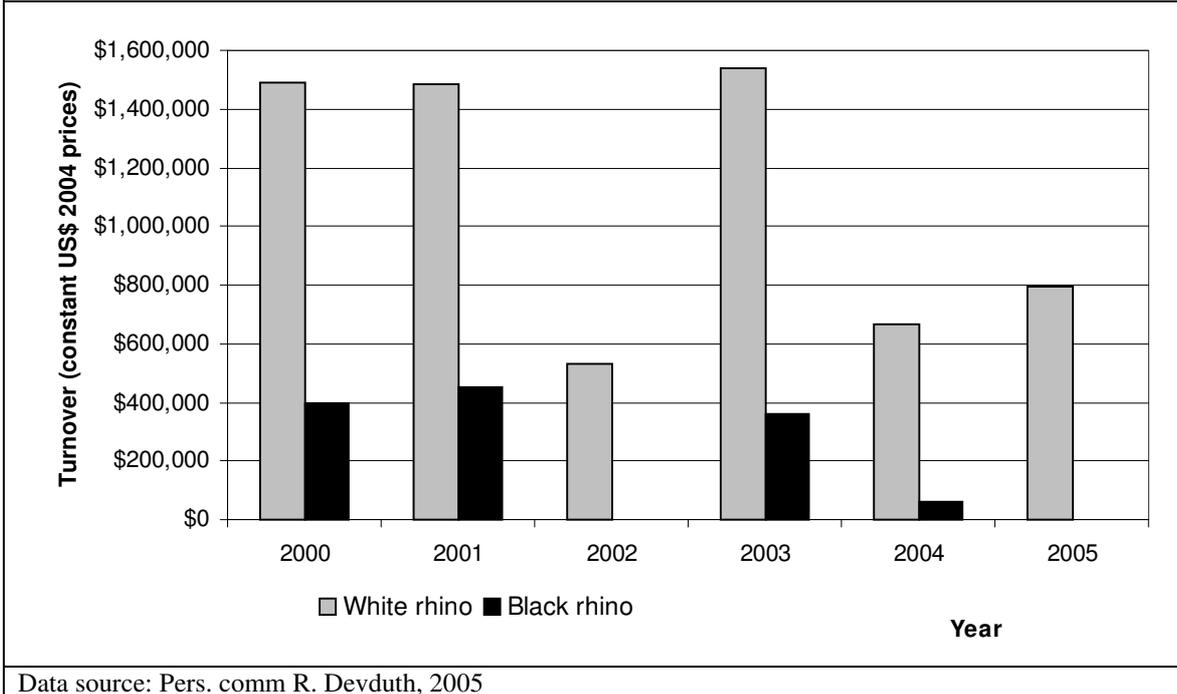
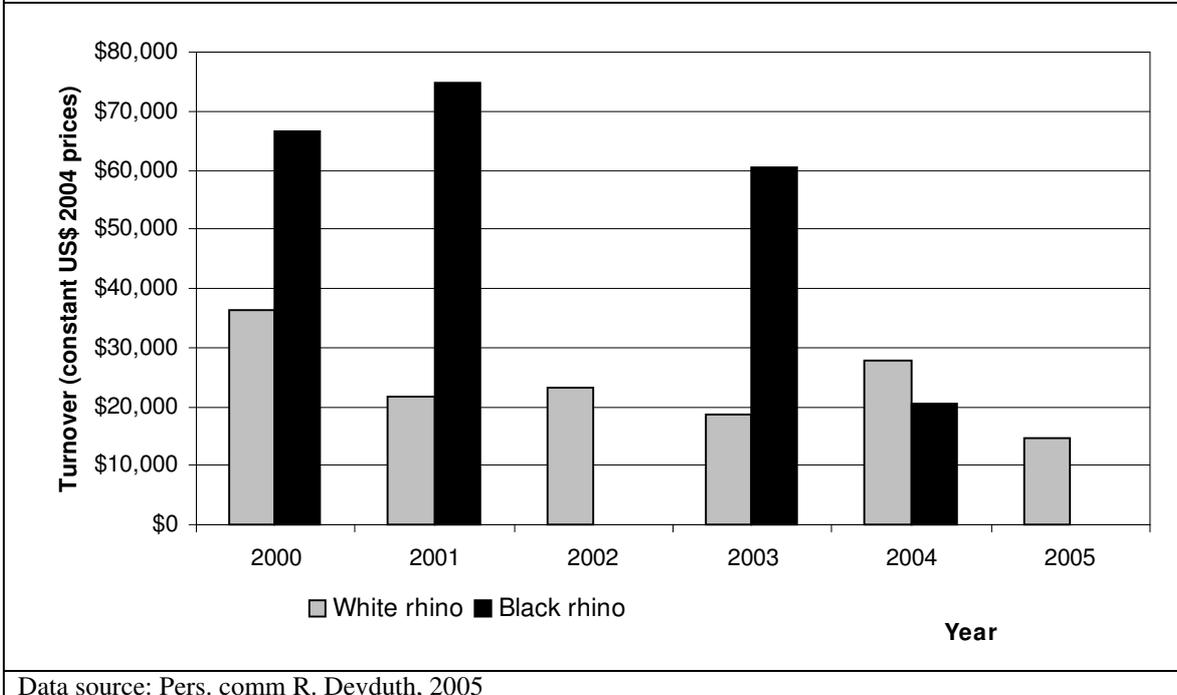


Figure 2 illustrates the average real price of black and white rhino sold between 2000 and 2005 at the KZN Wildlife game auctions. Although it may appear that the value of black rhino dramatically between 2003 and 2004, this is actually a reflection of the quality, age and gender of the animals sold: e.g. three young male black rhino were sold in 2004 (pers. comm. R. Devduth, 2005).

Figure 2: Average real price of white and black rhino sales at KwaZulu-Natal Game Auctions (2000-2005)



Important sources of revenue on game reserves include game viewing, hunting, retail operations and live game sales. Porter *et al* (2003) found that among 12 reserves in KwaZulu-Natal operating both game viewing and hunting - hunting generated 51.4% of their revenue, compared with 16.8%

for game viewing and 12.3% for live game sales. Not only do the sales of live rhino generate revenue for conservation management, but they also provide a mechanism for re-introducing species into areas where they may have become locally extinct, provides options for genetic diversification and to strengthen population sizes (Scriven and Eloff, 2003).

Despite limited sport hunting, the amount of land available for white rhino and their populations on private land have increased over time (Buys 1987, Emslie 1994a, Buijs and Papenfus 1996, Buijs 1998, Buijs, in press, cited in Emslie and Brooks, 1999). Given that there is limited capacity for state-run protected areas to hold more rhino, future population growth will need to depend upon private sector land availability. Therefore, maintaining incentives for the private sector and communities to host white rhino populations is very important (Emslie and Brooks, 1999). In 1996 it was estimated that over 20% of South Africa's white rhino population was in private hands (C' t sas Rolfes, 1996).

Within the context of this economic analysis, it is interesting to ask whether private landowners are primarily motivated by profit with regard to managing wildlife. In their survey of the profitability of nature-tourism in KwaZulu-Natal, Porter *et al* (2003) found that while 19 out of 23 (39%) private reserve managers in the province were primarily motivated by business, 11 businesses (48%) stated that nature-tourism was equally a business and way of life. Three reserve managers (13%) declared that it was more of a way of life than a business. With regard to operational goals, Porter *et al* (2003) found that while 26% of managers ranked maximizing profits as their most important operational goal, 61% rated the protection of threatened species as most important.

Little has been written on the potential socio-economic impacts of rhino on local livelihoods. Understandingly, studies undertaken around national parks and reserves tend to concentrate on the impact of predators and those that damage crops and infrastructure (e.g. lions, elephants, baboons) rather than rhino. Enhancing net benefits to local people from wildlife and conservation is recognized as increasingly important. The IUCN SSC recognizes that conservation of Africa's wildlife cannot be separated from people's livelihoods: "*The more local communities benefit from the protection of rhinos, the more secure will be the future of these magnificent animals.*" (Stuart cited in Emslie and Brooks, 1999: v). More critically, when the expansion of potential habitat for rhino extends to communal land and conservancies (as in the case of Namibia), the perception of rhino and net benefits derived from their consumptive and non-consumptive use become critical.

3. METHODOLOGY

A desk study was conducted on market issues and rhino from literature available through the IUCN Species Survival Commission African Rhino Specialist Group, the internet and reports sourced from stakeholders working on rhino conservation in the region. Wherever possible nominal values have been inflated or deflated to 2004 price levels, and converted to US\$ to facilitate comparisons. The multipliers used to do these conversions can be found in Appendix 2.

Case study sites were selected by identifying locations that would allow comparison of turnover and expenditure in relation to different or varying rhino populations from the availability of data, and which were amenable to participating in the study. Site visits were made to Hluhluwe-Imfolozi, Phinda and Windhoek to collect pertinent data and interview relevant stakeholders. Data collection approaches included interviews with key stakeholders and observation of rhino management activities, coupled with reviews of financial and management reports. Information was collected on revenue from hunting, photographic tourism and live sales; rack rates for services to tourists; occupancies; cost of sales; management and antipoaching costs due to rhino; external funding, and tourist demand studies where available. Where possible information was also collected regarding local financial and livelihood benefits from rhino.

A detailed financial and economic model, previously developed for the Torra conservancy, on communal land in arid north west Namibia, was modified to estimate the financial and economic values for black rhino in both the Torra and neighbouring Puros conservancies. As described in more detail below, these two conservancies are very similar, but while Torra has an established population of black rhino, Puros does not. No previously developed model was available for Puros. The Torra model was one of five used to measure the financial viability and economic efficiency of conservancy investments in Namibia (Barnes *et al.*, 2002). They consist of detailed budget and ten-year cost-benefit spreadsheets, with the parameters based on empirical data concerning conservancy performance to date and conservancy plans projected into the future. These conservancy models estimated returns to the investments made in the conservancy project by donors, government and the community. They also estimated returns to the specific investment of the community in the conservancy. Finally they estimated the contributions these investments made to the national economy (gross domestic product and net domestic product), and to employment.

Where conservancies have entered into joint ventures with private sector partners, as in the case of Torra, these, themselves, generated further financial returns in terms of private profits, community wages, and economic returns to the national economy. These additional joint venture values were included in Torra model to estimate rhino values. The Torra model was first used to estimate the values of a fully utilised rhino population in Torra itself, and then the values of rhino in Puros, if the species was introduced, established, and fully utilised.

The Torra/Puros rhino valuation models estimated *financial* returns to the capital invested in the conservancy and joint ventures, in terms of annual net income (profit), financial internal rate of return over five and ten years, and financial net present value of the investment over five and ten years. Net present value included the value of wealth created in the period. The financial values reflect actual transactions. To derive *economic* values, the financial costs and benefits were adjusted to reflect their true worth to Namibian society, in terms of economic growth. For this, shadow pricing was employed. Thus, the costs of unskilled and semi-skilled wages, were adjusted downward to compensate for job creation in the economy, the values for tradable goods were adjusted upwards to accommodate excess demand for foreign exchange, and transfers, such as taxes and subsidies, were removed as costs and benefits. Details of the specific assumptions applied in the rhino valuation exercise are provided in section 0. The key economic values were the annual value added to the gross and net national products as well as the ten-year net present value of value added contributions to net national product, including the creation of wealth. Value added represents the returns to internal factors (labour, capital and entrepreneurship) of the enterprise, or the gross output minus inputs from outside the enterprise.

The report that follows is divided into four main sections that address the key aims of the analysis outlined in section 1. These are followed by a discussion of the results in relation to the implications of the study for consumptive and non-consumptive uses of rhino within the SADC region, limitations and constraints of the work and proposed areas for further research.

4. THE ADDED VALUE OF RHINOS TO EXISTING WILDLIFE OPERATIONS IN STATE AND PRIVATE AREAS

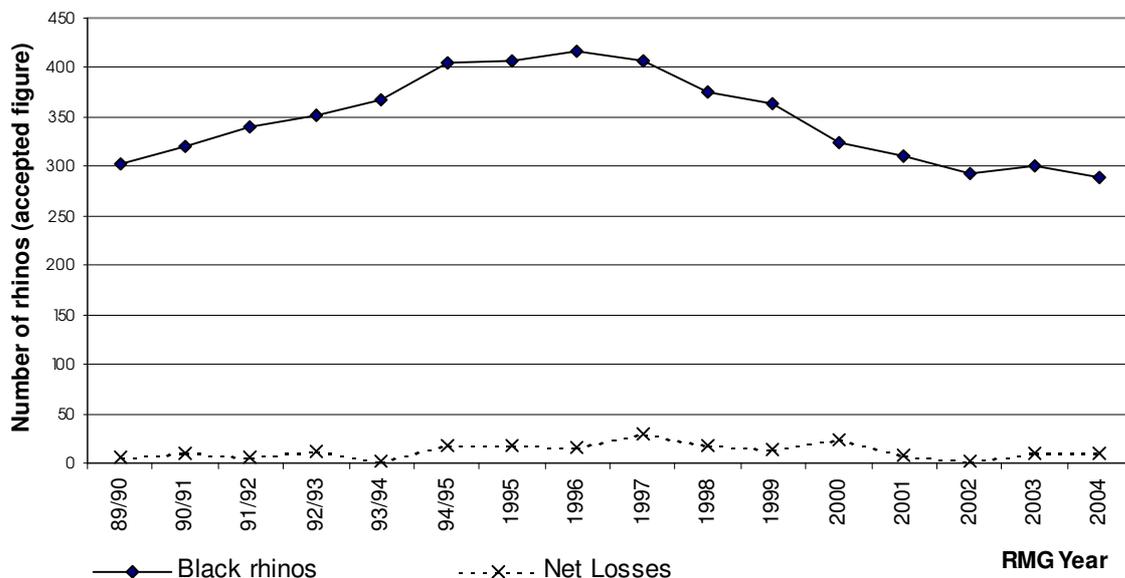
To evaluate the value that rhino add to wildlife operations in state and protected areas, three key sites were regarded: Hluhluwe-Imfolozi in South Africa; Wilderness Safaris operations in Namibia (Ongava and Palmwag); and CCAfrica's Phinda operation in South Africa. The financial benefits and cost associated with rhino and tourism in these areas have been quantified below, where data has been available.

State protected areas

Hluhluwe-Imfolozi is a state protected area managed by KwaZulu-Natal Wildlife, the provincial conservation agency. This 71,000 ha South African reserve is noted for its scenic views, grassy hills, deep wooded valleys and rich fauna (Pooley and Player, 1995).

The reserve has been implementing a strategy to harvest and sell or translocate 5-8% of the black rhino population annually (pers. comm. C. Reid, 2005). This approach has been driven because numbers exceeded the estimated Maximum Productive Carrying Capacity (eMPCC) in 2000 and a reduction in performance was the consequence. Subsequent removals have contributed to the reduction in numbers as the population adjusts to a lower density that can support these offtake levels (although actual average decline of 4.7% per annum between 1997 and 2004 indicates that KZN Wildlife have been under-harvesting: see Figure 3). There are indications that underlying performance is starting to increase again, although is still well below the desired target of 5% per annum (pers. comm. R. Emslie, 2005).

Figure 3: Black rhino population in Hluhluwe-Imfolozi (1989-2004)

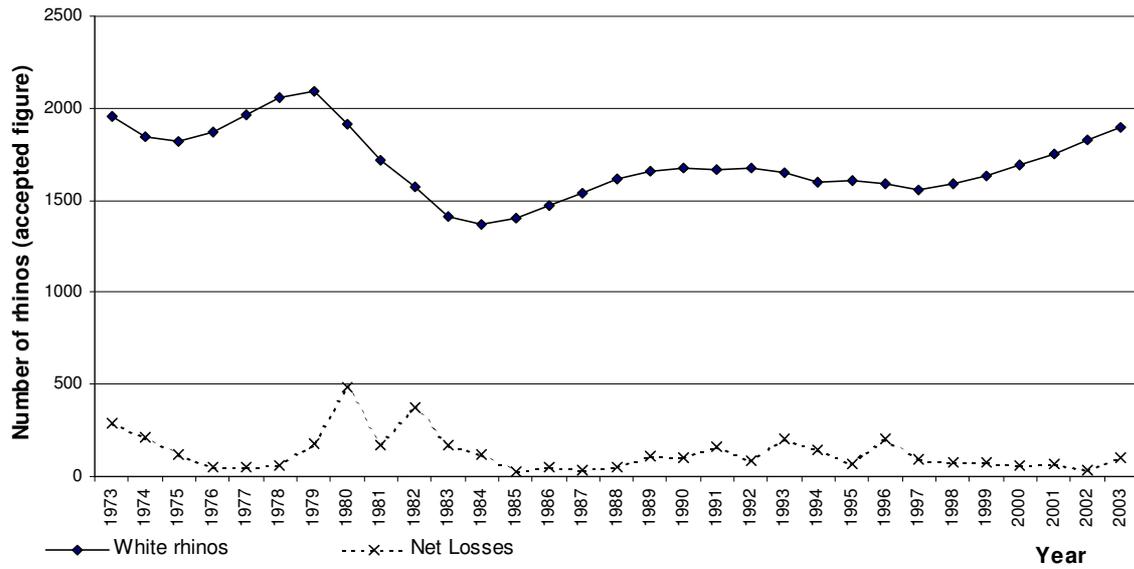


Data Source: KZN Wildlife data supplied to SADC Rhino Management Group, pers. comm. R. Emslie, 2005
NB Net losses include mortalities, removals and introductions

By contrast, since 1999 the white rhino population in Hluhluwe-Imfolozi has grown by an average of 3.8% per annum¹⁴. The reason for the dramatic decline¹⁴ in white rhino between 1980 and 1985 seen in Figure 4 was a major drought. Large numbers of rhino were translocated out of the park at this time to prevent further impact on the habitat and prevent elevated mortalities. Between 1979 and 1981 an amazing 803 white rhino were removed from Hluhluwe-Imfolozi (Brooks and Macdonald, 1983). Since 1985 the population has steadily increased to nearly 2000 animals in 2004 (KZN Wildlife/Earthwatch Institute)

¹⁴ This growth rate includes mortalities and removals.

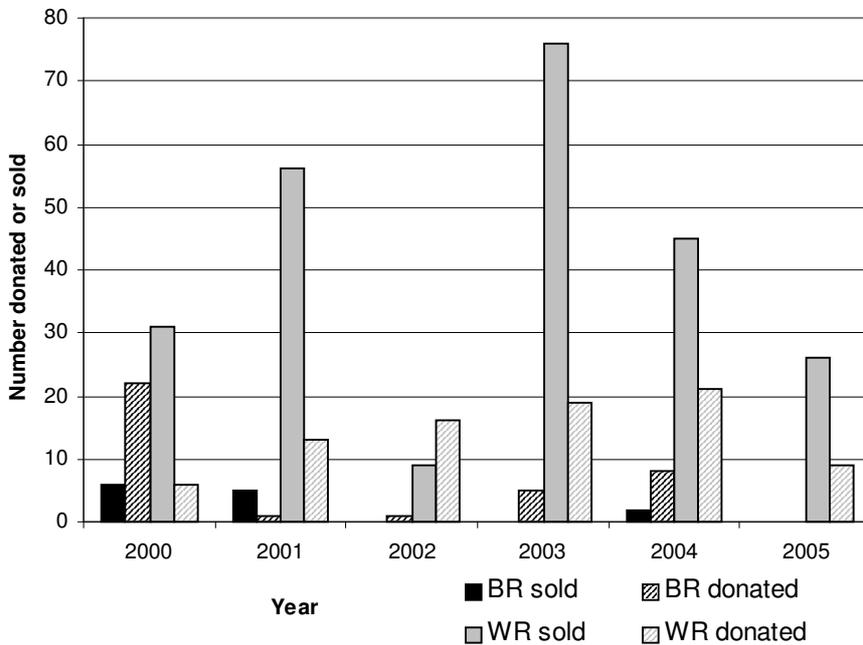
Figure 4: White rhino population in Hluhluwe-Imfolozi (1973-2004)



Data Source: KZN Wildlife / Earthwatch Institute, supplied by S. van Rensburg
 NB Net losses include mortalities, removals and introductions

The number of Hluhluwe-Imfolozi's black and white rhino either sold at auction or donated to other KZN Wildlife reserves since 2000 are shown in more detail within Figure 5¹⁵.

Figure 5: Black and white rhino sold and donated from Hluhluwe-Imfolozi (2000-2005)

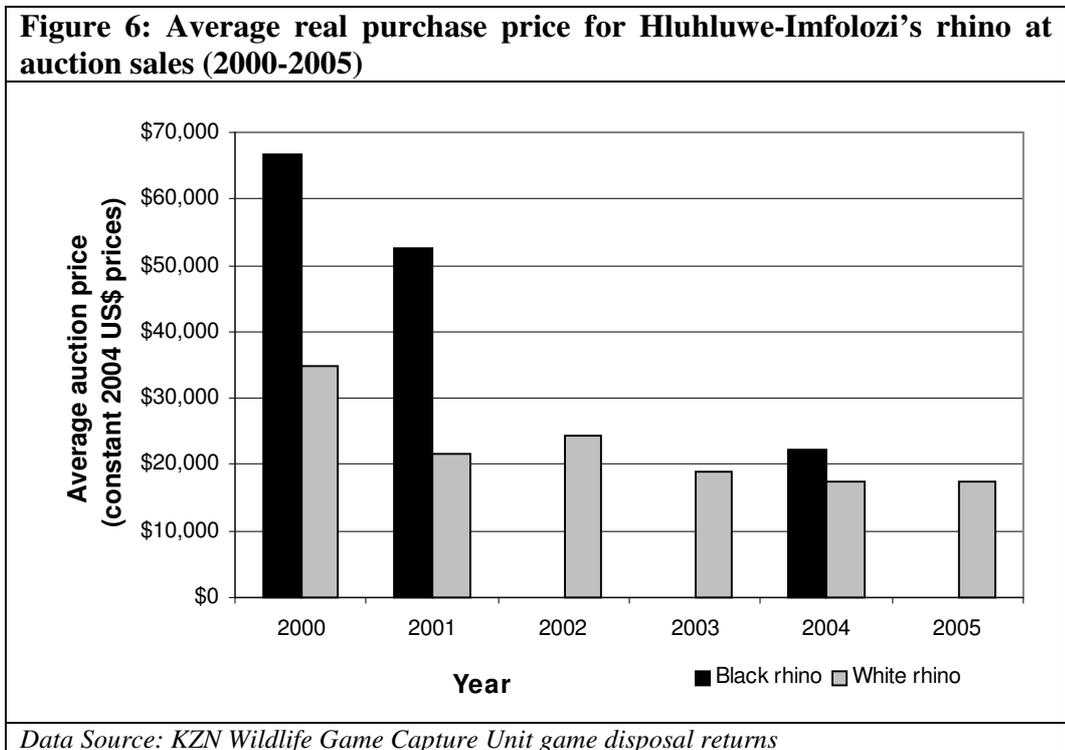


Data Source: KZN Wildlife Game Capture Unit game disposal returns
 NB: note that the 2005 figures are correct up to May 2005

¹⁵ Note that rhino from other KZN Wildlife reserves is also sold during these auctions, but only those captured in Hluhluwe-Imfolozi are shown here. A summary of rhino prices and turnover from all the reserves is shown in Figure 1 and Figure 2.

Figure 5 shows that numbers of black rhino disposed of by sale or donation annually have ranged between 0 and 28, and cumulatively since 2000 have numbered 50. Numbers of white rhino disposed of annually have ranged between 25 and 95, and cumulatively since 2000 have numbered 327 (mortalities are not indicated in this graph).

In general, the auction prices achieved by Hluhluwe-Imfolozi's white rhino has declined since 2000, from an average price of US\$34,888 to \$17,393 in 2005¹⁶ (a decline of 50% over six years) (see Figure 6).



By contrast, the average auction price for black rhino dropped by 21% from US\$66,575 in 2000 to \$52,562 in 2001¹⁷. After two-year gap when the reserve's rhino were not sold, the average price dropped to \$22,199¹⁸ (when only males were sold: pers. comm. R. Emslie, 2005).

The total turnover for white rhino sales¹⁹ the ranged from a peak of US\$1,474,441 for 76 animals in 2003 to \$452,230 for 26 animals in 2005 (up to May 2005)²⁰. For black rhino the turnover declined from US\$401,602 for 6 animals in 2000 to \$46,471 for 2 animals sold in 2004²¹ (see Figure 7)

¹⁶ Constant 2004 US\$ values.

¹⁷ Constant 2004 US\$ values

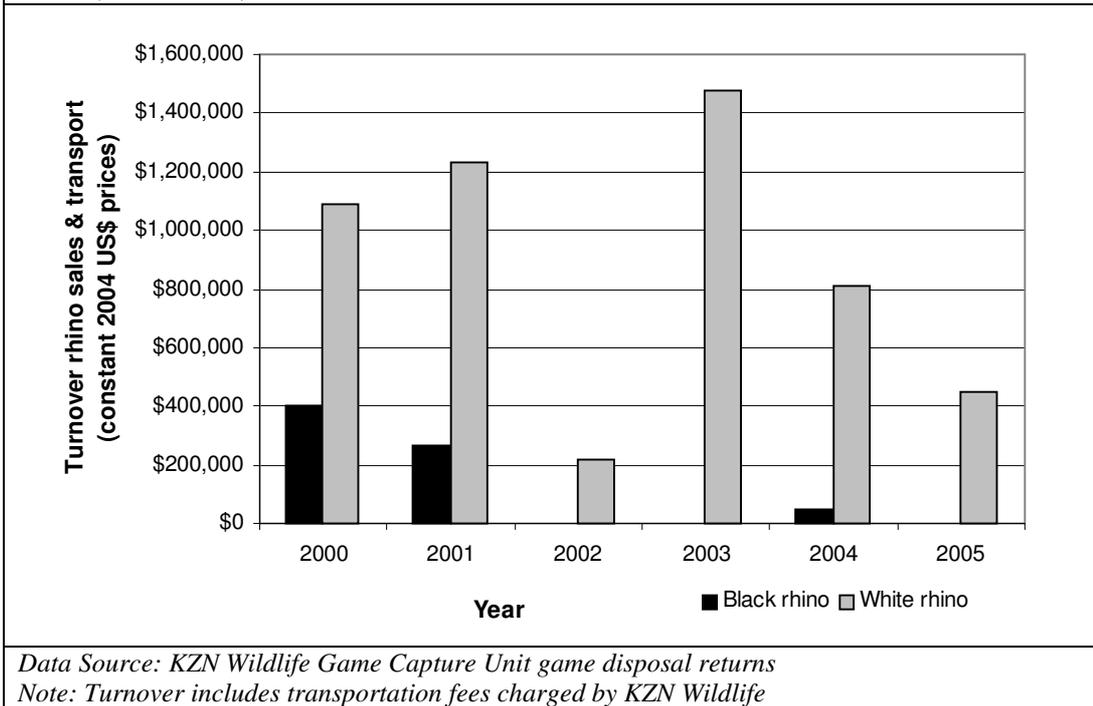
¹⁸ Constant 2004 US\$ values

¹⁹ Including costs charged by KZN Wildlife to transport them to the purchaser's property.

²⁰ Constant 2004 US\$ values

²¹ Constant 2004 US\$ values

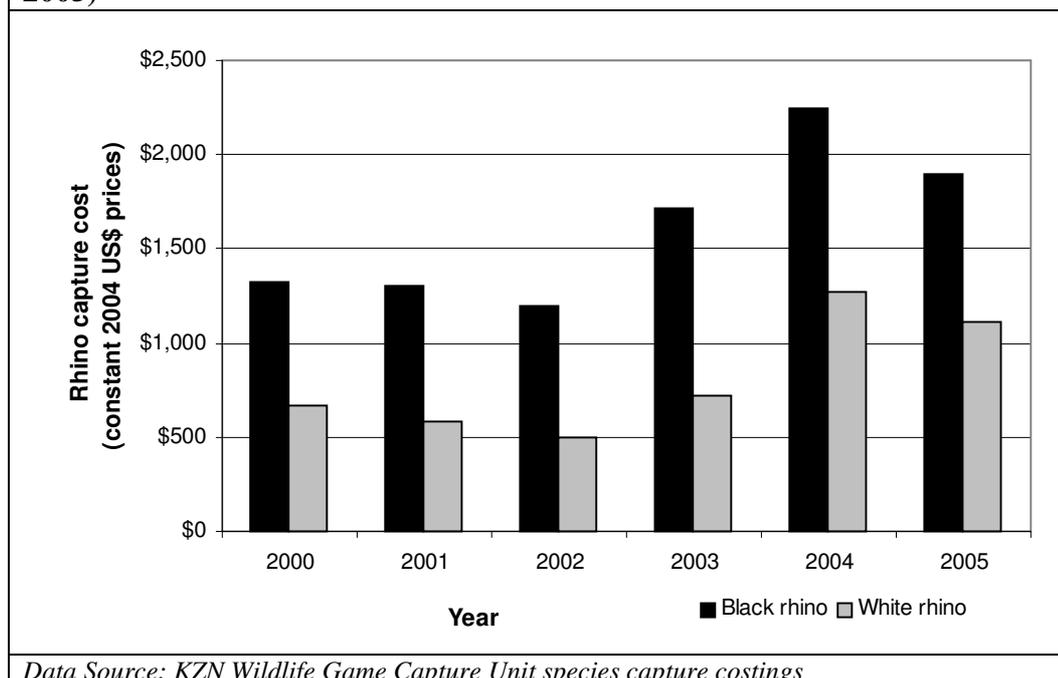
Figure 7: Total real turnover for Hluhluwe-Imfolozi's rhino sold at auction sales (2000-2005)



In order to ascertain the net profit from rhino sales, it is important to look at the costs associated with capturing white and black rhino. These costs include helicopter time, drugs, staff time, vehicles and equipment. KZN Wildlife's Game Capture Unit records show that these costs have risen steadily over the past six years, and that the capture cost for black rhino is 56% more than white rhino: in 1994 it cost US\$2,245 to catch a black rhino, and \$1,268 to catch a white rhino²² (see Figure 8). However, these ratios are not necessarily applicable elsewhere, as the method of capture, habitat and rhino density will affect the cost. The majority of the rhino capture cost in Hluhluwe-Imfolozi is attributable to the use of helicopters. In 2004 these represented 77% of the white rhino and 72% of the black rhino capture cost. KZN Wildlife can catch more white than black rhino in a day (6 white versus 2 black), which would contribute to overheads being higher for black rhino capture. These costs are underestimates, since the KZN Wildlife Game Capture department does not allocate its operational costs (e.g. staff time, telephone, administration) to different species, and therefore they were unable to calculate all costs associated with rhino and game capture operations (pers. comm. J. Cooke, 2005).

²² Constant 2004 US\$ values

Figure 8: Average real rhino capture cost in Hluhluwe-Imfolozi (2000-2005)



In 2000 the average white and black rhino capture costs were just under 2% of the average selling price, but in 2004 these had risen to 10% for black and 7.3% for white rhino. This decline in average profit has been due to the decline in average rhino prices coupled with the rise in associated capture costs.

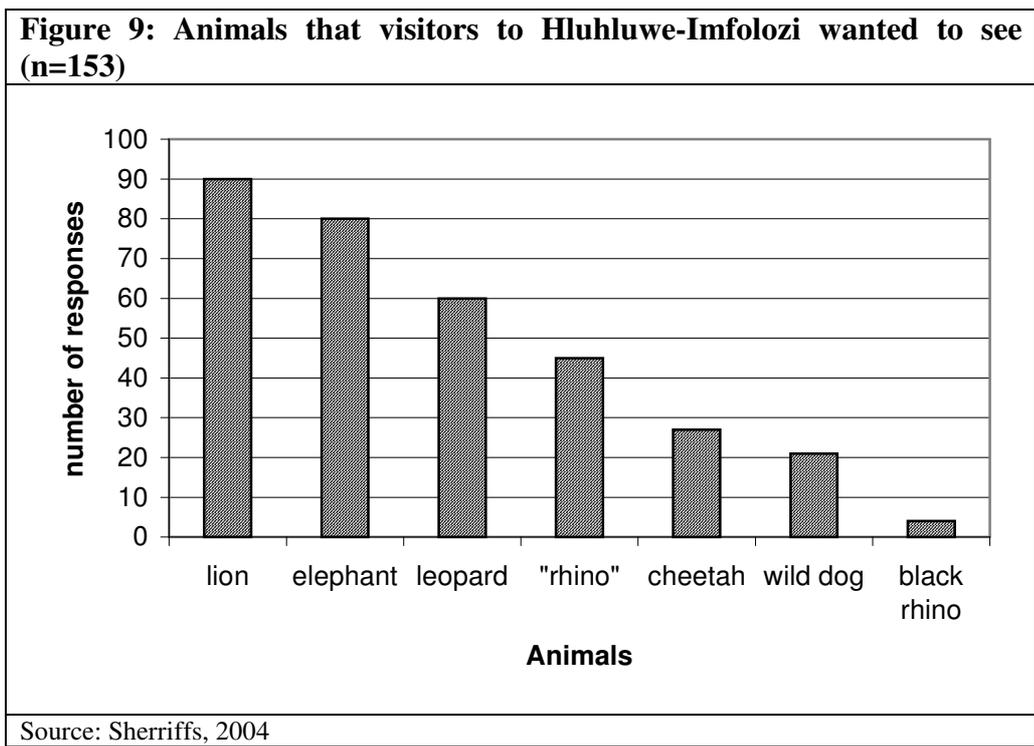
In light of the associated capture costs, the cumulative net profit from the sale of 243 white rhino from Hluhluwe-Imfolozi since 2000 was US\$4,995,441 while the net profit from 13 black rhino was \$687,731²³. However, it should be noted that this revenue does not accrue directly to Hluhluwe-Imfolozi Park, but is accrued centrally to KZN Wildlife. Therefore the profit generated by the increased rhino population due to conservation management in Hluhluwe-Imfolozi is used for the benefit of other protected areas in the province too.

Informal discussions were held with landowners who were interested in purchasing white rhino at the 2005 KZN Wildlife game auction. In one instance the rhino were to be purchased to supplement an existing population of four habituated rhino in the Western Cape at a photographic safari operation, and in another instance to start a new population in Botswana where hunting of other species took place. Discussions with a wildlife broker indicated that one of the reasons people purchased rhino from the game auction was that KZN Wildlife bore the risk until animals were delivered to the buyer, where buyers requested KNZ wildlife to organise the transportation. At other auctions sellers would transfer all risk to the buyer on the 'fall of the hammer'. The broker considered that prices for white rhino had dropped over time because there were more animals available on the market – not only from the game auction – and was also related to the number of trophy males on sale (the 2005 auction only had one trophy male on offer). WWF indicated that people were generally motivated to buy rhino either for photographic tourism, hunting or for their 'aesthetic' value.

²³ Constant 2004 US\$ values. Figures do not include transportation turnover, as the associated transportation costs are not known.

Recently, under the Convention on the International Trade in Endangered Species (CITES), South Africa and Namibia were been granted an annual allocation of five black rhino that may be hunted for trophies and their trophies exported (Black, 2004). In anticipation of this the IUCN African Rhino Specialist Group proposed a set of guidelines to ensure that any black rhino hunting is carried out on a sustainable basis (Leader-Williams *et al.*, 2005). These essentially involved making sure that off-takes are biologically sustainable, well monitored and controlled, and making sure that the process confers maximal incentives for, and rewards for, good biological management. The park is now under pressure to raise additional funds from their black rhino population, by selling some as hunting trophies. Some of KZN Wildlife staff are concerned that approach is incompatible with their work with WWF to conserve the species (pers. comm. S. Nxumalo, 2005), but WWF do not oppose safari hunting provided certain conservation criteria are satisfied (pers. comm. R. du Toit, 2005).

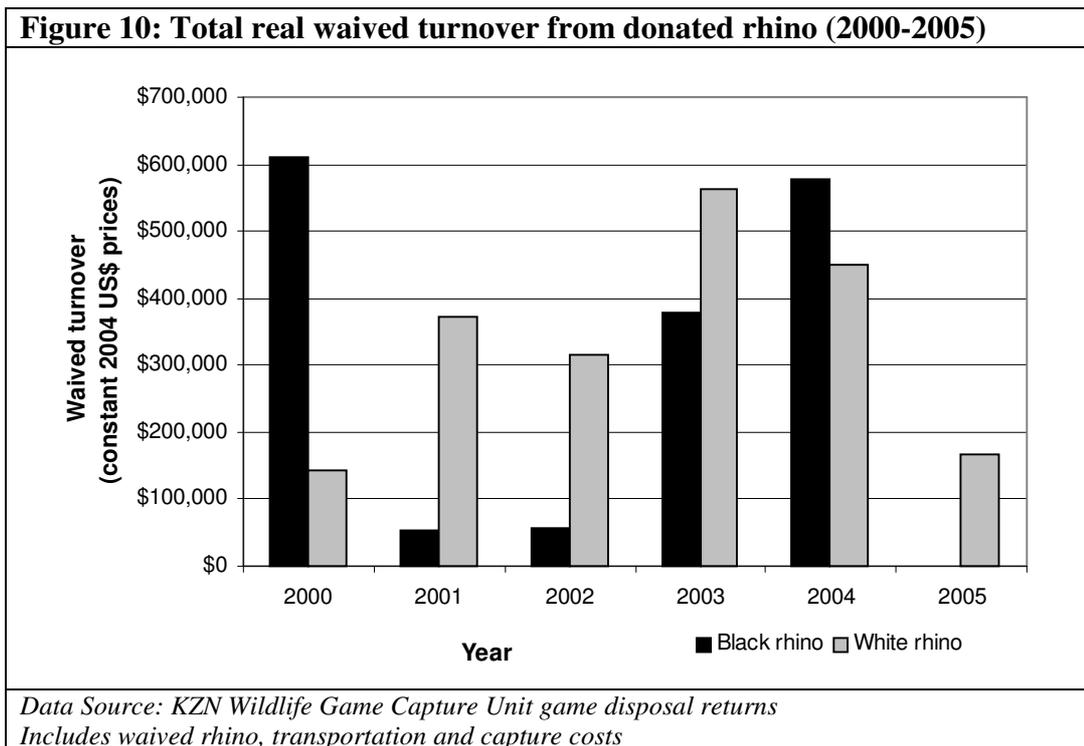
In February 2004 a study was undertaken under the Black Rhino Range Expansion Project to ascertain the level of demand from tourists in Hluhluwe-Imfolozi to view rhino. Participants include 153 tourists from 14 countries, 50% of whom were South African. The survey revealed that the majority of visitors were aware of two kinds of rhino being present in South Africa. However, when asked which (if any) animals they were specifically hoping to see in the reserve, 29% mentioned “rhino” and only 3% mentioned black rhino specifically (see Figure 9) (Sherriffs, 2004).



Interestingly, none of the respondents said that the presence of black rhino in the reserve would affect their decision to visit (Sherriffs, 2004). Although this was a short study, it implies that none of the tourism turnover in Hluhluwe-Imfolozi is directly attributable to the presence of black rhino. However, it would have been useful to know what responses would have been given to the same question regarding ‘rhino’ in general for context.

Hluhluwe-Imfolozi absorbs the transportation, capture and ‘capital’ costs for rhino translocated or donated to other KZN Wildlife reserves in the province. Between 2000 and 2005 the total value of

revenue 'waived' due to donations or internal translocations amounted to US\$1,672,999 for black rhino (n=37) and \$2,012,495 for white rhino (n=84)²⁴ (see Figure 10).



Some conservation management activities are done for the benefit for rhino and other species, so that it is difficult to separate out proportion of the cost is directly attributable to rhino. For example, the park has a program to clear the invasive alien plant *Chromolaena* sp., and between 2003 and 2004 the provincial government and Department of Agriculture and Environmental Affairs provided around US\$ 1.64 million, and it was anticipated that between \$1.2 and \$1.9 million would be received in 2005²⁵. Although the clearance has benefits for other species do, it has a particular benefit for improving black rhino habitat (pers. comm. S. van Rensburg, 2005).

Private protected areas

4.1.1 Wilderness Safaris in Namibia: Palmwag and Ongava

Wilderness Safaris operates two camps, under private concession and ownership, in the north of Namibia that are particularly related to black rhino: Palmwag and Ongava.

Palmwag Rhino Camp is located within the private Palmwag Reserve in Damaraland, north-west Namibia, and has populations of desert-adapted black rhino and elephant (Wilderness Safaris, Undated-a). Wilderness Safaris and Savé the Rhino Trust (SRT) have forged a partnership to promote tourism that generates revenue to finance black rhino monitoring costs. A SRT monitoring team is based at the camp which leads tourist safaris and provides information to guests on their work (Hearn and Bakkes, undated). Tourists follow the monitoring team in a separate vehicle, and track the animals on foot when spoor are seen (pers. comm. P. Nicholls, 2005). The SRT also built an indaba centre near Palmwag for community leaders to come and discuss conservation matters with their colleagues (Wilderness Safaris 2005a). The 16-bed camp has been running for two years

²⁴ Constant 2004 US\$ values

²⁵ Constant 2004 US\$ values

with 19 staff from all over Namibia and should be operationally break-even at 38% occupancy within six months. The US\$340,000²⁶ capital costs should be paid off within the concession period. Wilderness Safaris pay wages for four SRT staff in addition to financing their vehicle and operational costs. In addition, 5.5% of the income from tourist's accommodation is donated to SRT. On average visitors pay US\$223²⁷ per person for a night's full board at the camp, and last year 1480 guests participated in the tracking (all of the guests). Wilderness Safaris also owns part of a 44-bed road lodge and campsite nearby, which caters to self-drive tourists and overland trucks. Each year around 700 visitors each year (approximately 70% of guests) also undertake the tracking activity (pers. comm. P. Nicholls, 2005). The Palmwag operation shows that there is a market for black rhino tracking in Namibia, and also that tourism revenue from this activity can be used to subsidise substantial conservation and monitoring costs through an NGO partnership.

Wilderness Safaris' Ongava lodge is located within a 30,000 ha private reserve located along Etosha's southern boundary, and is marketed as a location where both white and black rhino can be observed (Wilderness Safaris, undated-b). Wilderness Safaris have operated the camp since 1995, by which time white rhino and black rhino were already present (pers. comm. R. Moffett, 2005). The reserve has also been selected to participate in the Ministry of Environment and Tourism (MET) black rhino custodianship scheme. Four rhino from Etosha were released into Ongava, with the translocation costs borne by WWF, MET and the reserve (Wilderness Safaris, 2005b). There are three camps on the reserve, with a total of 48 beds and the camps employ 85 staff from all over Namibia. The rack rates vary from US\$279 to \$796 per person, sharing, depending on the season and camp chosen²⁸. Wilderness Safaris report that the reserve is operationally break-even, with between 47% and 60% occupancy at the three camps over the past year (including the conservation management costs for rhino, which are estimated to cost US\$160,000 annually²⁹) (pers. comm. R. Moffett, 2005).

To estimate the level demand for rhino viewing among Ongava's guests, a small survey was conducted among the guides. Five guides with cumulatively 8 years experience in the reserve completed a simple questionnaire (see Appendix 1) and reported that although the majority wanted to see rhino (either black or white), none of them reported that the presence of rhino motivated their trip. As one guide, Wilson Garafa stated "*Most guests do not understand the difference between black and white rhinos but they understand that black rhino is very aggressive and [it is] difficult to see them. A rhino is a rhino because it is an endangered species.*" Despite this, there is a perception that without the presence of rhino, the camp would generate approximately half the level of current income: although the same number of tourists would visit, the day rates would be halved (pers. comm. R. Moffett, 2005). Therefore, rather than the presence of black or white rhino in particular, tourists may be willing to pay higher rates if there are rhino within a destination. These observations support evidence of tourist behaviour in Zimbabwe, where it is reported that, ". . .*the presence of rhinos is a . . .top rating for a wildlife operation, like 4 stars*" (pers. comm. R. du Toit, 2005). Similarly, a cost-benefit study applied to South Africa parks in 1992 suggested that tourists were motivated to visit a ". . .*real Big 5 park, rather than specifically to see rhino*" (pers. comm. R. Emslie, 2005).

4.1.2 Phinda, KwaZulu Natal, South Africa

Phinda is a privately owned reserve covering 12,699 ha located within the 18,100 ha Munyawana conservancy in KwaZulu-Natal (pers. comm. K. Pretorius, 2005). Phinda's four lodges and walking safari operation have a total capacity of 104 beds. Starting in 1991, Conservation Corporation

²⁶ Constant 2004 US\$ values

²⁷ Constant 2004 US\$ values

²⁸ Constant 2004 US\$ values

²⁹ Constant 2004 US\$ values

Africa worked to rehabilitate degraded agricultural and pastoral land and also supplemented wildlife populations with over 1500 head of game, including white rhino (CCAfrica, undated a). Phinda currently has a population of 72 white rhino, and in 2004 received a seed population of black rhino (pers. Com. K. Pretorius, 2005).

Phinda is involved in the Rhino Range Expansion Project, and in October 2004 received 15 black rhino from KZN Wildlife (pers. comm. K. Pretorius, 2005). The rhino worth an estimated US\$1.05 million³⁰ (KZN Wildlife game capture returns) were received by Phinda at no capital cost, while WWF-Netherlands supported the capture and translocation to the value of almost US\$38,087³¹ (pers. comm. J. Flamand, 2005)³². Phinda did not pay for the rhino because they are their custodians, and KZN Wildlife retains ownership and management control over them. Phinda is obliged to pay for ongoing monitoring of the rhino that are in their care and make regular reports regarding their behaviour for a period of 25 years. The reserve is also obliged to maintain the quality of habitat, browse and water availability for the safe custody, survival and growth of the black rhino population (Anon, 2004).

Phinda estimated that they had spent US\$23,821 capital expenditure on equipment and upgrades for their black rhino monitoring program (e.g. GPS, telemetry vehicle, upgrade accommodation and vehicle), and at least US\$870 on consultancies³³. In addition US\$2,332³⁴ expenditure was allocated to hosting site inspection trips, KZN wildlife staff and a media launch (pers. comm. K. Pretorius, 2005).

Operational vehicle and maintenance costs associated with black rhino were estimated at US\$544, per month and an estimated US\$171 per month is spent of management time on black rhino³⁵. Also, since their arrival four additional employees have been employed to monitor the black rhino: three of who are from local communities. The monitors are paid US\$1,794 per month cumulatively and local staff earn US\$1,477 of this, or US\$17,722 annually³⁶ (pers. comm. K. Pretorius, 2005). Therefore operational costs associated with the black rhino are US\$2,509³⁷ per month. Extrapolation of this information indicates that Phinda incurs approximately US\$171³⁸ expenditure per black rhino each month. In addition, the black rhino have had a small but clear and immediate financial benefit on the local economy through wages. With regard to white rhino, approximately once a year a rhino has to be darted and tranquillised to undergo some form of veterinary treatment³⁹.

There has been no increase in the rates for accommodation or activities at Phinda since the black rhino were introduced (pers. comm. K. Pretorius, 2005). An analysis of the tourism turnover and gross operating profit at Phinda for six months after the introduction of the black rhino, compared with the same period for the previous two years failed to reveal either additional revenue or costs associated with their presence. In fact both turnover and expenditure declined over this period. It is highly likely that wider factors such as the exchange rates, pricing, marketing and consumers disposable income have had a greater impact on the turnover and gross operating profit than rhino.

³⁰ Constant 2004 US\$ values

³¹ Constant 2004 US\$ values

³² WWF-Netherlands also provided US\$23,214 (at constant 2004 US\$ values) worth of staff time and logistical support to the development of the agreement (pers. comm. J. Flamand, 2005)

³³ Constant 2004 US\$ values

³⁴ Constant 2004 US\$ values

³⁵ Constant 2004 US\$ values

³⁶ Constant 2004 US\$ values

³⁷ Constant 2004 US\$ values

³⁸ Constant 2004 US\$ values

³⁹ The veterinary and drug costs of such a capture are estimated at R2,000 per animal (pers. comm. K. Pretorius, 2005).

In return for their custodianship, Phinda benefit from an equal share in the proceeds from any growth in their population with KZN Wildlife (pers. comm. J. Flamand, 2005). Potential revenue generated from live sales of the progeny will not be sufficient to offset the operational costs of managing the black rhino. Assuming a 5% annual growth in the rhino population, Phinda would have 24 animals after 10 years. Therefore 8 could be sold and Phinda would retain the revenue from four. Assuming live sale values for black rhino remain constant at 2004 levels, this would on average generate US\$8,861⁴⁰ annually for Phinda. Assuming that operational expenditure at Phinda remain constant for additional wages, staff time, vehicles and maintenance would mean annual costs of US\$30,113⁴¹. The net financial loss annually associated with monitoring the rhino would therefore be an estimated US\$21,252⁴². Other sources of rhino-related revenue (e.g. tracking, donations) aside from live sales may also be required to generate sufficient income to cover Phinda's expenditure. Given that the conservation and population growth of black rhino is a motivation for private landowners to participate in the custodianship program, it is possible that Phinda is not only interested in generating income from the animals. However, future private landowners wishing to participate in the custodianship program should undertake a market-related scenario analysis so that they are aware of the likely costs of their participation.

Since 2002, Phinda has sold 14 white rhino through negotiated sales. The average price over 3 year has been US\$17,256 providing a total turnover of US\$241,000, and a net profit of US\$192,800 when the capture costs are deducted⁴³. It is interesting to note Phinda's perception that customers pay premium values for Phinda's rhino because they were habituated to vehicles (pers. comm. K. Pretorius, 2005).

In a long-term management process, Phinda's white rhino gradually all being darted in order to insert microchips in their horns and perform ear notching for future identification. To help finance this monitoring work, Phinda aims to offers Rhino darting safaris four times a year within a four-day/three night specialist safari package for between 2 and 12 guests at the cost of US\$428 per person⁴⁴. Guests are provided with information on rhino tracking, darting, micro-chipping and are allocated responsibilities such as measuring heart rate, watering the animal and so on. Under the supervision of experts including a veterinary surgeon, the package includes participation in a rhino darting operation (CCAfrica, 2003).

Between 1999 and 2004 Phinda ran 28 rhino darting safaris that 132 people participated in. The revenue from each safari varied according to the number of people participating: US\$1,555 for two people up to US\$6,685 for a group of twelve⁴⁵. Once the cost of darting the rhino has been deducted, the non-consumptive safaris cumulatively generated US\$435,300⁴⁶ net profit between 1999 and 2004. This illustrates the use of tourism to not only finance conservation monitoring of rhino but also generate profit for tourism enterprises, despite the small number of tourists who participate. However, it should be noted that this revenue contributed a very small proportion of Phinda's total turnover, and actually declined substantially from 4.3% in 2002/3 to 0.7% of turnover in 2003/4 (calculated from data provided by K. Pretorius, 2005). More detailed research could potentially establish the size and trends of this specialist market niche in southern Africa, and whether this decline is a trend attributable to the level of marketing or a real indication of decreasing demand in general. Importantly, the extent to which rhino darting safaris could provide a stable and substantial income for a landowner would depend critically on the rhino population and

⁴⁰ Constant 2004 US\$ values. $(R142,500 \times 4 \text{ rhinos}) \div 10 \text{ years} = R57,000 \text{ per year}$

⁴¹ Constant 2004 US\$ values

⁴² Constant 2004 US\$ values

⁴³ Constant 2004 US\$ values

⁴⁴ Constant 2004 US\$ values

⁴⁵ Constant 2004 US\$ values

⁴⁶ Constant 2004 US\$ values

the frequency of darting operations. Clearly there is a limit to the frequency of this type of operation in relation to the management requirements and safety for the animal, and more unobtrusive activities (e.g. rhino tracking) would provide a more stable income.

As with Ongava (see section 4.1.1), a small survey was conducted among Phinda's guides in attempt to establish the level demand for rhino viewing among guests. Twelve guides with cumulatively 46 years experience in the reserve provided information regarding their guests. Although on average 76% of guests reported that they wanted to see rhino on the reserve, only some knew the difference between black and white rhino. However, guides most frequently reported that none of their guests' primary reason for visiting Phinda was to see either black or white rhino. Also guides indicated that guests want to see rhinos in addition to other species, but that they are not their main reason for visiting. The extent of the variations within the data mean that it is probably misleading to interpolate the findings of this survey further: e.g. to determine what proportion of Phinda's turnover is attributable to the presence of rhino. The demand for rhino viewing and the extent to which this affects visitation and turnover is certainly an area of investigation that could benefit from more thorough study.

Phinda anticipates that a black rhino tracking experience will be guests in the future, and it is probable that a market study would be undertaken before hand to determine the appropriate price and likely demand (pers. comm. K. Pretorius, 2005).

Although the focus of this study on financial benefits, it has been considered important to include some information on non-financial benefits that came to light during the study, such as environmental education. Phinda operates conservation lessons on a monthly basis for local school children. The lessons consist of an educational talk by a guide followed by a game drive on the property. Since the black rhino were introduced on the property in October 2004 these lessons have been focussed in particular on the black rhino and its conservation status (pers. comm. K. Pretorius, 2005). Since the black rhino were introduced 144 children from five local schools have participated in the lessons. The associated costs of US\$623⁴⁷ were borne by donations channelled through the Africa Foundation (pers. comm. K. Bankier, 2005). The Africa Foundation is an organisation founded by CCAfrica to facilitate the empowerment and development of people living in and adjacent to protected areas in Africa (CCAfrica, undated b).

In addition to the lessons, fourteen local school children have participated in the white rhino darting operations on Phinda. The white rhino capture operations are usually offered to paying guests (see above) but in one instance this attraction was offered to 8 local children instead, and in another instance in 2004 children from a school in Tzaneen raised money for a group of their pupils and a group of 6 local children to participate and cover the costs of the exercise (pers. comm. K. Pretorius, 2005).

5. HOW PROTECTION AND MONITORING OF RHINO AFFECTS OTHER WILDLIFE

Evaluating how the protection and monitoring of rhino affects other wildlife was constrained by the way in which these activities are undertaken and budgeted for in parks. For example, the nature conservators in Hluhluwe and Imfolozi indicated that their entire conservation management budgets could effectively be attributed to rhino protection (pers. comm. C. Reid, 2005). However, this is because conservation management is orientated towards maintaining reserve integrity, and therefore the reserve's capacity support all species and habitats, rather than for the protection of any species in particular. It was indicated that the finances available for conservation had been reduced to their

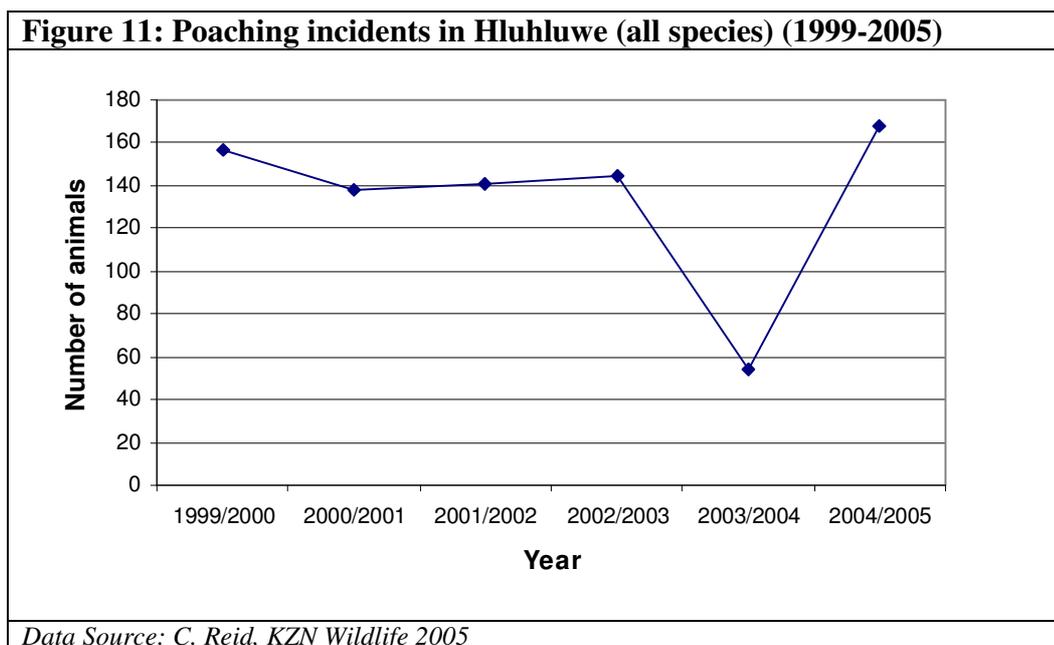
⁴⁷ Constant 2004 US\$ values

lower limit, and if they declined further the risk to rhino would increase substantially. The conservation managers were unable to specify portions of their budget that were directly and specifically attributable to rhinos due to the way in which budgets were allocated. Their budget is spent on activities to:

- keep law enforcement staff comfortable and morale high (e.g. regarding the quality of accommodation and uniforms);
- maintain infrastructure;
- maintain road access for anti-poaching activities; and
- maintain fences.

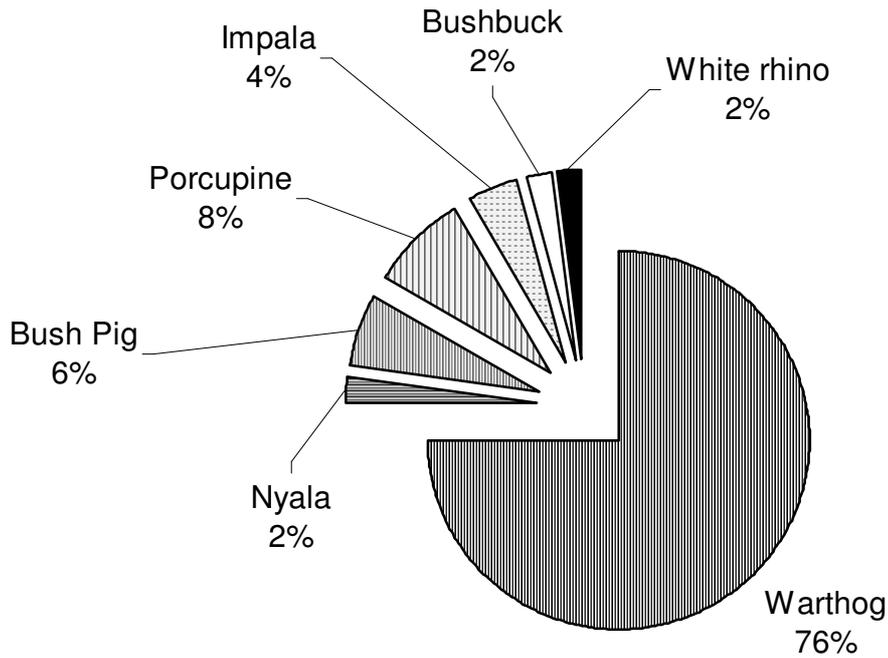
A substantial proportion of the anti-poaching budget is spent on staff wages and enhancing staff morale by providing adequate accommodation, uniforms and working conditions. High morale was considered to be a substantial factor in ensuring low poaching figures. At this level of protection on average 1.6 white rhino are poached each year, while no black rhino have been lost since 1990 (Data from C. Reid, 2005). Imfolozi has experienced lower levels of poaching than Hluhluwe, with no rhino poaching over the past five years.

Between 1999 and 2005 Hluhluwe lost 803 animals to poaching, and the annual loss is depicted in Figure 11.



The frequency of poaching different species is outlined in Figure 12 and shows that smaller animals are most frequently taken: warthog, bush pig and impala.

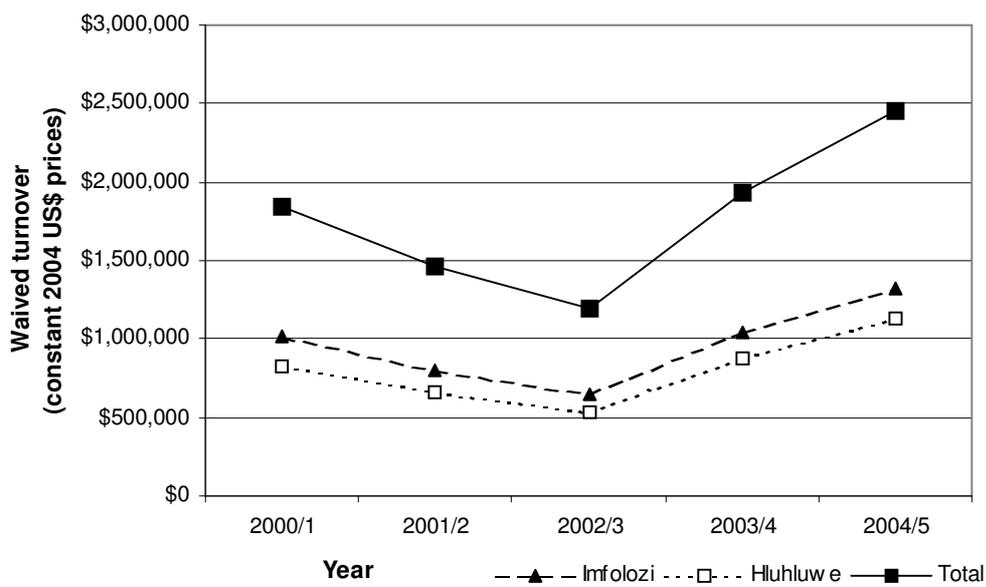
Figure 12: Species poached in Hluhluwe (2002/3)



Data Source: C. Reid, KZN Wildlife 2005

According to the nature conservators in the reserve, the entire conservation management budget could be said to be attributable to rhino management, as they manage for reserve integrity. The budgets for Hluhluwe-Imfolozi rose gradually between 2000 and 2005 (see Figure 13). Although the white rhino population also grew over this time period (see Figure 4) it is unlikely that the cause of the increased budget has been the increase in rhino population, as it is likely many other factors led to the increase.

Figure 13: Real budgets for Hluhluwe-Imfolozi (2000-2005)



Data Source: S. Bellringer, KZN Wildlife 2005

Part of the antipoaching budget is provided by the US Fish and Wildlife Service, and in the 2004-5 financial year they donated US\$51,000. KZN Wildlife annually bids for support to assist with

management equipment for field rangers and antipoaching staff. The Wildlands conservation trust also provides donations periodically for conservation work, including for rhino (pers. comm. C. Reid, 2005). Donors provided 4.3% of Hluhluwe conservation budget in 2004.

The conservation activities in Hluhluwe-Imfolozi has an impact on the livelihoods of local people, as approximately 67% of the 218 conservation management staff in the park come from communities within 20-30 km of the park (pers. com. C. Reid and S. Nxumalo, 2005). Despite the 'reserve integrity' approach to conservation management, it is not possible to determine what proportion of these people are employed due to the presence of rhinos: none of them work specifically on this species. A community conservation division works with local communities, but not specifically in relation to rhino.

Not all wildlife monitoring activities are financed by KZN Wildlife, and annual monitoring of rhino and eight other large mammal populations is undertaken using through donations and volunteers organised by the Earthwatch Institute. During 2004 donations totalled US\$34,117 for a three-month monitoring period, and US\$9,347 was contributed for game census equipment⁴⁸. KZN Wildlife representatives reported that without these donations, and the labour provided by volunteers they would not be able to finance the monitoring (pers. comm. S. van Rensburg and S. Nxumalo). KZN Wildlife also receives monitoring assistance from WWF, who in 2004 donated US\$20,252⁴⁹ for monitoring equipment and training (pers. comm. C. Reid, 2005). In all, donor money accrued by Hluhluwe-Imfolozi that is directly attributable to rhinos was around 7% of all donations during 2005, or approximately 0.3% of the entire conservation budget.

Therefore in Hluhluwe-Imfolozi the protection and monitoring of rhino populations is inextricably linked with that of other species. However, it is not possible to state to what extent the 'absence' or 'presence' of rhino would affect the level of protection in a site where there have always been rhino. At Phinda, however, where a new population of black rhino were introduced in October 2004 (see section 4.1.2) four additional people were employed to undertake the monitoring, but no additional anti-poaching staff were recruited. In part, the reason that they received the rhino under the Black Rhino Range Expansion Project was because their wildlife protection mechanisms and relationships with local communities were already well developed.

6. THE IMPACT OF RHINO ON COMMUNITY-BASED TOURISM AND LOCAL LIVELIHOODS

Rhino in the Namibian conservancy programme

The Namibian conservancy programme is incentive-based and gives people in communal lands the rights to manage and benefit from natural resources. Once registered, a conservancy acquires rights and responsibilities for the consumptive and non-consumptive use and management of wildlife, on behalf of the community it represents. The main requirements for registering conservancies are that they must have a defined membership and a committee that is representative of community members. Conservancies must also be legally constituted with clearly defined boundaries that are not disputed with neighbouring communities. The government formally owns conservancy land but communities have rights of occupation. By 2003 there were 29 registered conservancies in Namibia, covering over 7 million hectares of communal land (23% of all communal land), and populated by almost 100,000 people – of which 40,000 were registered conservancy members (NASCO, 2004).

⁴⁸ Constant 2004 US\$ values

⁴⁹ Constant 2004 US\$ values

Financial benefits generated by rural communities within the conservancy programme have increased dramatically, from around US\$188,019 in 1998 to US\$1.2 million in 2003⁵⁰. The Namibian economy earned about US\$16 million⁵¹, directly and indirectly from CBNRM in 2003. Money earned by conservancies is generally used for conservation and land management, salaries/wages or benefits (dividends) for member households. Wildlife populations have increased substantially in association with the programme (NACSO, 2004). Estimates suggest that black rhino populations have more than doubled over the past 30 years in the north-western region of Kunene (Hearn, 2003), and at least a part of this increase can be attributed to CBNRM.

The rapid growth of the tourism industry has encouraged conservancy development in recent years, and new opportunities for trophy hunting concessions, lodges and campsites have arisen. Revenues have allowed some conservancies to become financially self-sufficient (NASCO, 2004). Joint venture tourism lodges and camps tend to be the most lucrative source of income, and conservancies are paid, through rentals and royalties, within income sharing agreements. Trophy hunting concessions provide the second highest income source for conservancies, through concession fees, game meat and employment. Other sources of income include campsites and other community based tourism enterprises, sale of craft and live sales of wildlife (e.g. springbok) (NASCO, 2004).

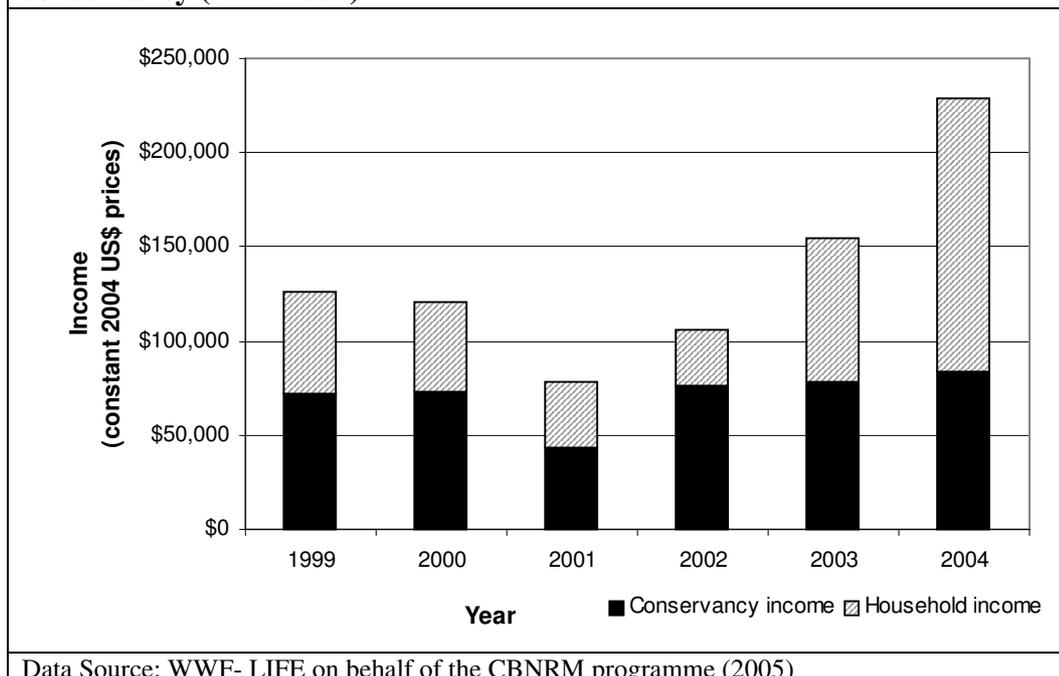
The Torra and Puros conservancies in the Kunene region are very similar sizes (3522 km² and 3568 km² respectively) and are both described as arid - receiving less than 100 mm rain each year. Both areas are largely semi-desert with sparse savannah, and the landscape is characterised by a mixture of hills, plains and wooded river valleys. In both conservancies annual vehicle based wildlife counts are undertaken and are populated by elephant, lion, leopard, cheetah, giraffe, kudu, duiker, springbok, steenbok, oryx, mountain zebra and klipspringer (NASCO, 2004). In addition, Torra also has populations of warthog and ostrich. Torra contains a fully stocked population of black rhino, but in Puros the population is limited to one or two, located in remote areas, inaccessible to tourists. The two conservancies are sufficiently similar to form the basis for a comparative study of local economic impacts, with a view to identifying those impacts related to the presence of black rhino.

The Torra conservancy was registered in June 1998, providing wildlife and stark desert scenery. The management committee consists of five men and one woman, and employs five members of staff: Community Game Guards, a Conservancy Activator, a Field Officer and a Receptionist. Torra is populated by approximately 1200 people. In 2003 Torra conservancy earned income from craft sales, joint venture tourism (the Damaraland Camp operated by Wilderness Safaris), live game sales, meat distribution, use of game, trophy hunting and interest (NASCO, 2004).

⁵⁰ Constant 2004 US\$ values

⁵¹ Constant 2004 US\$ values

Figure 14: Real conservancy and household income to the Torra conservancy (1999-2004)

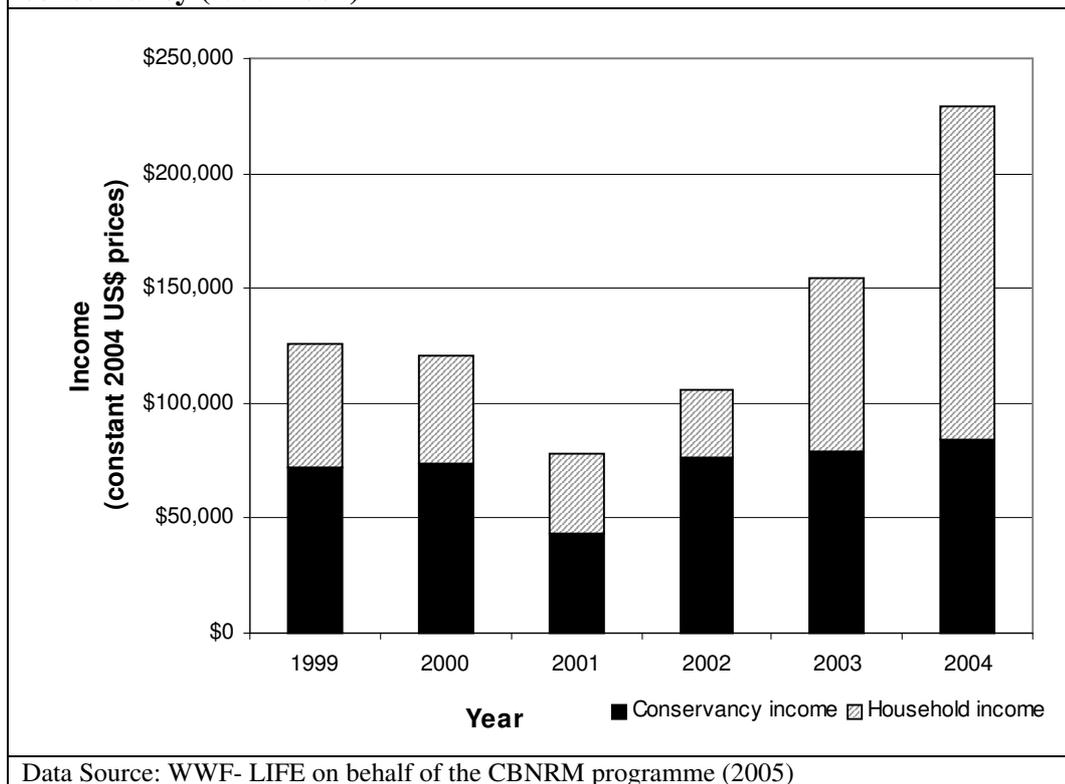


Between 1999 and 2004 the Torra conservancy accrued a total of US\$428,034, while \$385,867 was distributed to households in the form of wages⁵². The financial income (so not including income from donations) has tended to rise by an average of 29% per annum since 1999. The majority of the revenue has been generated from the joint-venture tourism operation, trophy hunting and live sales of ungulates such as springbok. In 1994 these three sources contributed 84% of the total financial benefit from the conservancy.

The Puros conservancy was registered more recently, in May 2000. It provides spectacular dune, hill and desert scenery. A committee of two women and ten men manages the conservancy, with six executive members, and there are seven employees involved in day-to-day operations: three Community Game Guards, two Conservancy Activators and two Field Officers. Wildlife and domestic animals graze together near to villages. Puros is populated by approximated 260 of the Ovahimba and Herero people. Enterprises operating in Puros include two joint venture agreements; a conservancy campsite; traditional village and craft market; and 'own use' hunting takes place (NASCO, 2004).

⁵² Constant 2004 US\$ values

Figure 15: Real conservancy and household income to the Puros conservancy (1999-2004)



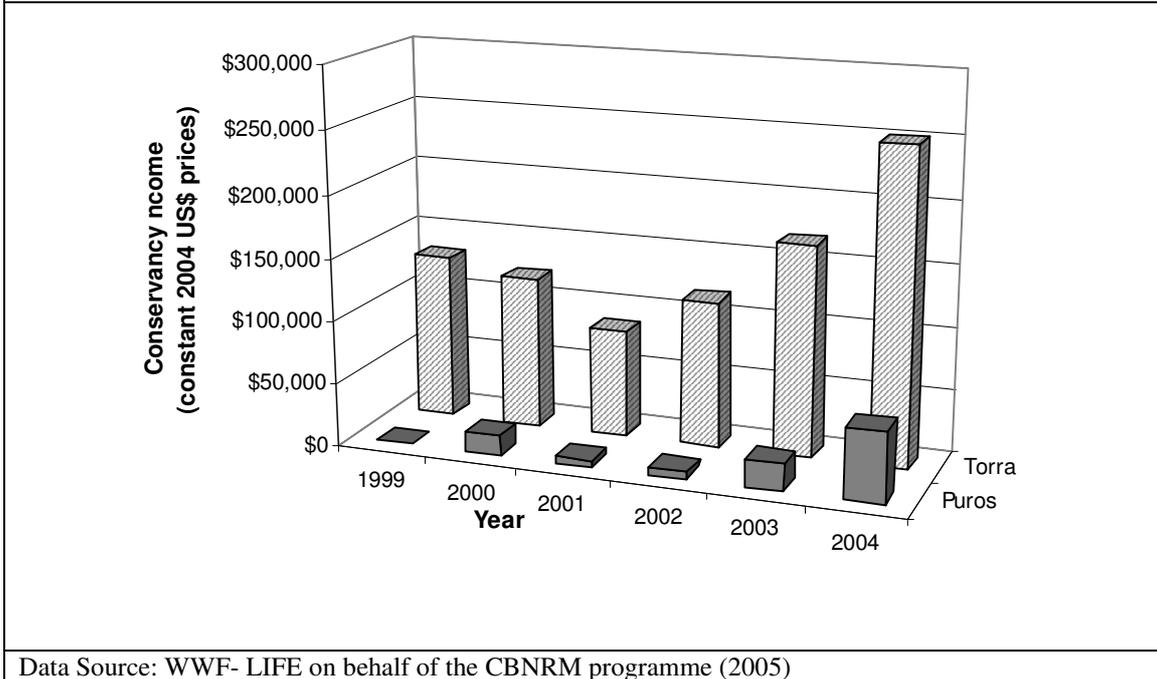
During 2003 Puros conservancy earned revenue from campsites, cultural tourism, craft sales, joint venture tourism, use of game, trophy hunting and interest (NASCO, 2004).

Between 2000 and 2004 the Puros conservancy accrued a total of US\$33,581 while US\$55,317 was distributed to households in the form of wages⁵³. The financial income (i.e. not including income from donations) has tended to rise by an average of 181% per annum since 2000. The majority of the revenue has been generated by four joint venture operations. In 1994 these three sources contributed 97% of the total financial benefit from the conservancy.

The total financial benefits accrued to the Torra and Puros conservancies are compared in Figure 16, and show that Torra's income has been substantially greater than Puros since initiation. Although the conservancies are comparable in terms of their size and habitats, it is not possible to say that the difference in the revenues is directly attributable to rhino.

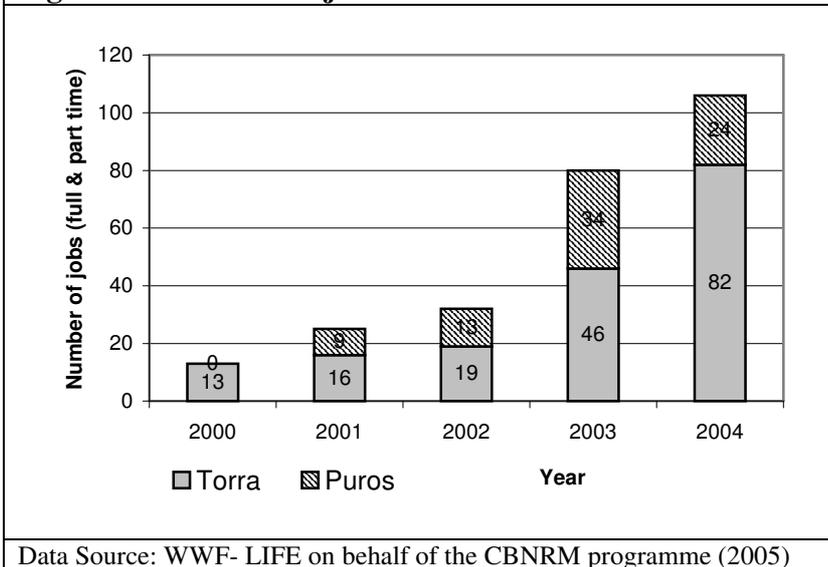
⁵³ Constant 2004 US\$ values

Figure 16: Total real financial benefit to Torra and Puros conservancies (1999-2004)



The increase in revenue over time in the two conservancies has also been associated with an increase in the number of full and part-time jobs. Figure 17 indicates that the number of jobs rose from 13 in Torra in 2000 to 96 in both reserves in 2004.

Figure 17: Number of jobs in Torra and Puros



Potential additional sources of income for the Torra conservancy that are directly related to the presence of black rhino include their hunting potential and the opportunity to offer photographic tracking safaris. These activities also have the potential to impact on local livelihoods by providing additional sources of employment and revenue.

In 2004 CITES amended the Appendix 1 conditions for black rhino to allow Namibia and South Africa the opportunity to hunt and export five each year (Black, 2004). By the time this report was completed, none of these animals had been hunted, and therefore a real market value was not known. To obtain an idea of the potential price, four professional hunting companies working in Namibian conservancies were asked whether they had received any interest from clients wishing to hunt black rhino, and what they would be willing to pay. They reported that clients had offered between US\$100,000 and \$1 million, and that the daily rate on a 10 to 21 day hunt would range between US\$1000 and \$2200 per day. In Torra, a sustainable trophy off-take of 1% of the black rhino population of some 20, would allow one animal to be hunted every five years. Our analysis using the Torra conservancy investment model, presented in 0, below, shows that this would generate significant new net benefits for the conservancy.

There is considerable demand among private landholders in Namibia and South Africa for live black rhino. The black rhino population, of some 20, in Torra could sustain an off-take of some 5% per annum which means that one animal per year could be sold by the conservancy. If hunting was also practised, then about eight rhino could be sold over ten years. Significant financial and economic benefits could be generated from this and they are included in the Torra community investment analysis presented under 0, below.

With regard to rhino tracking safaris, existing examples from Wilderness Safaris operations at Ongave and Palmwag has shown that there is already a market within the country (see section 4.1.1). Without the luxury-tented accommodation, Wilderness Safaris estimated that rhino tracking only would cost tourists US\$129⁵⁴ (including drinks and lunch). The camp has had positive implications for local livelihoods, by the employment of 12 local people during the construction of the camp, and operational employment of 19 people (15 of whom are from Damaraland. However, none of the construction materials or operational purchases are procured locally, and either come from Windhoek or South Africa (pers. comm. P. Nicholls, 2005). In the financial and economic analysis of rhino values presented in 6.2, below, we assumed that the community would begin guided rhino tracking operations. These were able to generate positive benefits.

Market research was undertaken in the Torra, Doro and //Khoadi conservancies in 2004 to ascertain the potential for photographic rhino tourism in conservancies (Sibalatini, 2004). The aspects studied included the impact of human disturbance in rhino, the level of satisfaction among tourists at Palmwag and perceptions of tour operators, local community members and other stakeholders. Of fifty tourists interviewed at Palmwag, 98% saw black rhino and 79% reported being satisfied with their experience. Their proximity to the rhino did not appear to impact on the level of satisfaction. Interestingly tracking black rhino was not the only reason that they visited: other motivations included the scenery, luxury camping and the use of local trackers. Among 134 local people interviewed, greater benefits from black rhino were perceived where most rhino and tourists were already present (e.g. those living in close proximity to Torra and tourism facilities). Tourism was identified as the best option that would allow them to benefit from rhino in the area, through partnerships with companies.

Research on the attitudes and perceptions of local communities to the re-introduction of black rhino in Namibia was undertaken in 2004 within three conservancies located near Torra: #Khoadi-//Hoas, //Huab and Omatendeka (!Uri-#Kob, 2004). Household studies were undertaken on the edge of wildlife areas and in the middle of the conservancy, with randomised sampling of settlements. More than 80% of the 304 participants indicated support for relocation of black rhino into their conservancies. Motivations for the re-introduction included that they would be a tourism attraction and that they could generate employment (e.g. community game guards to act as rhino monitors).

⁵⁴ Constant 2004 US\$ values

Although many also thought that rhino could pose a threat to human life, most people had never seen them themselves. People did not consider that there would be significant competition with livestock for browse or water (!Uri-#Kob, 2004).

Financial and economic contribution of rhino in Torra and Puros conservancies

As stated, we used a detailed financial and economic model for Torra conservancy to estimate the current and potential financial and economic impact of black rhino in the Torra and Puros conservancies. In the case of Torra, the potential value of full use of the existing rhino population was estimated. In the case of Puros, the potential value of the establishment and full use of a population of black rhino was estimated. No previously developed model is available for Puros, but the Torra model was used to simulate the conditions that could pertain at Puros if rhino were introduced. The analyses are simplified in that both areas do not have white rhino, and they are not suited to them, although they both do have three other big five species: elephant, lion and leopard.

The rhino population in the Torra conservancy is currently used as part of non-consumptive wildlife viewing associated with joint venture lodges. Potential exists for further use of the population in terms of live sales, trophy hunting and tourism diversification, including provision of some guided rhino tracking services. Both the Torra and Puros models embrace investments for three components, the community conservancy, a trophy hunting joint venture, and two wildlife viewing joint ventures. Our comparative analysis was based on the premise that the two conservancies were the same, except that Torra conservancy already has rhino, while Puros would need to introduce and establish a population before using them. However, du Toit (pers. comm. 2005) indicates that of all the 'big five' mammals, rhinos have the greatest potential to fit into mixed land-use systems in Africa, since they occupy well-defined home ranges, do not carry livestock diseases, and are adapted to a wide range of southern African habitats.

First the current costs of rhino conservation and the current value of rhino viewing tourism were removed from the Torra model. The values of the Torra conservancy investment *without* rhino were then estimated. Then costs for rhino conservation were re-introduced, values for rhino viewing were reintroduced, and values for rhino hunting, rhino live sales, and some rhino guided tracking were introduced, to the model. The values for the Torra conservancy investment *with* rhino and rhino utilisation were then estimated. The differences between the values from the "with" and "without" models provided estimates of the value of black rhino to the Torra conservancy. The Puros analysis was similar, except that the capital costs of introduction and establishment of rhino were included in the "with rhino" model.

The capital costs of stocking the Puros area with rhino, and the recurrent costs of rhino conservation, were derived from the data obtained in the Hluhluwe-Imfolozi, and Phinda case studies described above. Values were adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16. In Puros, it was assumed that close to the full stock of rhino would be established in years one and two of the analysis period, allowing full utilisation to take place as early in the period as possible. It was also assumed that the financial cost of establishing rhino was subsidised by 50% by the government or donors, however, for the economic analysis, the full opportunity cost of the capital investment was given.

Our assumption on the proportion of wildlife viewing values attributable to rhino, was based on the study by Sherriffs (2004) on demand for wildlife viewing experiences in the Hluhluwe-Imfolozi complex, as well as the brief survey on client demand, conducted among guides at Phinda and Ongava (described under 0, above). It was estimated that between 7% and 14% of wildlife viewing values in those areas are attributable to rhino. The higher value was assumed to apply to Torra. Based on a national survey of Namibian nature-based tourist demand (Barnes *et al.*, 1999), the

value of wildlife viewing, as opposed to the value of scenery and other attributes, makes up some 50% of the total value of the tourism experience. We thus assumed that 7% (half of 14%) of wildlife viewing values in both conservancies would be attributable to black rhino.

For the potential consumptive uses it was assumed that the rhino population could produce sustainable off-takes of 4% and 1% per annum for live sales and trophy hunting, respectively. This means that during ten years, from a population of 20 rhino, eight could be sold live, and two surplus bulls could be hunted. Given that these are average figures in the model, and given that a population of 20 is likely an underestimate for Torra, we consider this assumption to be reasonable. Prices for live sales and the costs of capture and transportation were derived from the data obtained in the Hluhluwe-Imfolozi, and Phinda case studies. Values for rhino trophy hunting (i.e. trophy prices, daily rates, staff requirements) were obtained from a specific survey of Namibian professional hunters. The rhino capture and transportation costs from KwaZulu-Natal were doubled for the model. These costs are high for the southern African region, but in line with recent Namibian government capture unit estimates, which reflect the very great distances prevalent in Namibia, as well as government limitations and inefficiencies. We consider them conservative but realistic. Values for guided, rhino tracking were adapted from the data obtained on Phinda's guided, rhino darting activities, as well as the nearby established rhino tracking operation at Palmwag, described above.

Table 2 and Table 3 show the values associated with the community conservancy investments in the Torra and Puros models, respectively. The comparative financial results show a small increase (4%) in capital costs for Torra and a very large increase (736%) for Puros. The latter reflect the huge costs of rhino establishment, even though this is assumed to be 50% subsidised. The conservancy annual turnover increased significantly by 103%, for both conservancies, as a result of the high value of rhino use. However, while the annual net income (profit) enjoyed by the Torra conservancy increased by 493%, that for Puros declined, due to the higher costs of servicing the capital investment. A better measure of annual conservancy benefit is annual community income, which includes this net income, as well as salaries/wages paid to community members, and distributed dividends. This increased by 173% in Torra and 61% in Puros. The financial net present value of the conservancy investment, measured over ten years, increased significantly (by 710%) in Torra, and by less (255%) in Puros. For Puros the positive growth in financial net present value largely reflects the value of wealth created due to the investment in rhino stock.

Table 2: Financial and economic values attributable to full use of black rhino in the Torra community conservancy investment, Namibia dollars (N\$), 2004

Measure	Units	Community conservancy investment ¹			
		Basic values without rhino	Value change with rhino	Value change per hectare	Percentage change
Physical measures					
Conservancy extent	Hectares	352,200	352,200	352,200	352,200
Black rhino population	Head	20	20	20	20
Financial measures²					
Capital investment	N\$	1,688,900	63,500	0.20	4%
Turnover	N\$/annum	1,083,800	1,107,200	3.10	102%
Net income	N\$/annum	112,900	557,200	1.60	493%
Community income	N\$/annum	543,700	941,100	2.70	173%
Net present value	N\$, 10 years @ 8%	1,117,400	7,935,100	22.50	710%
Economic measures³					
Gross output	N\$/annum	1,148,800	1,173,600	3.30	102%
Economic costs	N\$/annum	397,800	306,000	0.90	77%
Contribution to GNP	N\$/annum	751,100	867,600	2.50	116%
Contribution to NNP	N\$/annum	651,700	867,600	2.50	133%
Net present value (NNP)	N\$, 10 years @ 8%	4,975,700	9,608,400	27.30	193%

¹ Investment by the community in the Torra conservancy, with assistance from donors and government, deriving annual net benefits from own enterprises and joint venture rentals/royalties, as well as investment in stock

² Financial returns to the conservancy project investors, including community and donors

³ Contribution of the investment to the national product (gross and net national product)

⁴ Values adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16

The comparative financial results show a small increase (4%) in capital costs for Torra and a very large increase (736%) for Puros. The latter reflect the huge costs of rhino establishment, even though this is assumed to be 50% subsidised. The conservancy annual turnover increased significantly by 103%, for both conservancies, as a result of the high value of rhino use. However, while the annual net income (profit) enjoyed by the Torra conservancy increased by 493%, that for Puros declined, due to the higher costs of servicing the capital investment. A better measure of annual conservancy benefit is annual community income, which includes this net income, as well as salaries/wages paid to community members, and distributed dividends. This increased by 173% in Torra and 61% in Puros. The financial net present value of the conservancy investment, measured over ten years, increased significantly (by 710%) in Torra, and by less (255%) in Puros. For Puros the positive growth in financial net present value largely reflects the value of wealth created due to the investment in rhino stock.

Table 3: Financial and economic values attributable to the introduction and full use of black rhino in the Puros community conservancy investment, Namibia dollars (N\$), 2004

Measure	Units	Puros community conservancy investment ¹			
		Basic values Without rhino	Value change With rhino	Value change per hectare	Percentage change
Physical measures					
Conservancy extent	Hectares	356,800	356,800	356,800	356,800
Black rhino population	Head	0	20	20	20
Financial measures²					
Capital investment	N\$	1,688,900	12,421,700	35.30	736%
Turnover	N\$/annum	1,083,800	1,114,600	3.20	103%
Net income	N\$/annum	112,900	-56,900	-0.20	-50%
Community income	N\$/annum	543,700	329,200	0.90	61%
Net present value	N\$, 10 years @ 8%	1,117,400	2,852,400	8.10	255%
Economic measures³					
Gross output	N\$/annum	1,148,800	1,181,400	3.40	103%
Economic costs	N\$/annum	397,800	1,586,000	4.50	399%
Contribution to GNP	N\$/annum	751,100	-404,600	-1.10	-54%
Contribution to NNP	N\$/annum	651,700	-404,600	-1.10	-62%
Net present value (NNP)	N\$, 10 years @ 8%	4,975,700	483,800	1.40	10%

¹ Investment by the community in the Puros conservancy, with assistance from donors and government, deriving annual net benefits from own enterprises and joint venture rentals/royalties, as well as investment in stock

² Financial returns to the conservancy project investors, including community and donors

³ Contribution of the investment to the national product (gross and net national product)

4. Values adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16

The economic measures in Table 2 and Table 3 give a better idea of the true values associated with the rhino as they are measured at the true opportunity cost of inputs and outputs. Comparison between the values for the two conservancies shows that that rhino in Torra would contribute much more annually to the gross and net national product than the rhino in Puros. The high opportunity cost of the capital investment in the Puros model would push the annual contribution the conservancy makes to the gross and net national products down. Similarly, the high initial capital costs in Puros result in a much smaller ten-year economic net present value, relative that of Torra.

Table 4 and Table 5 show the impacts of the introduction and use of rhino in the conservancies, which are not captured in the community conservancy investment models of Table 2 and Table 3. These include the value of additional capital investments, by the private sector, hunting and wildlife viewing, joint venture participants, as well their private costs and profits. They also include the salaries and wages paid by these enterprises to conservancy members. The additional capital needed is very small, but all of the annual and ten-year, net present values show significant increases. In

particular the true economic measures for the hunting joint venture show large increases due to rhino establishment.

Table 4: Financial and economic values attributable to black rhino in trophy hunting joint ventures, Torra and Puros conservancies, Namibia dollars (N\$), 2004					
Measure	Units	Torra or Puros hunting camp joint venture investment ¹			
		Basic values Without rhino	Value change With rhino	Value change per hectare	Percentage change
Physical measures					
Conservancy extent	Hectares	352,200	352,200	352,200	352,200
Black rhino population	Head	20/0	20	20	20
Financial measures²					
Capital investment	N\$	381,500	13,300	0.00	3%
Turnover	N\$/annum	933,900	459,400	1.30	49%
Net income	N\$/annum	157,800	112,300	0.30	71%
Community income	N\$/annum	46,201	11,550	0.03	25%
Net present value	N\$, 10 years @ 8%	271,100	214,500	0.60	79%
Economic measures³					
Gross output	N\$/annum	881,000	433,400	1.20	49%
Economic costs	N\$/annum	458,600	78,100	0.20	17%
Contribution to GNP	N\$/annum	422,400	355,200	1.00	84%
Contribution to NNP	N\$/annum	368,100	354,500	1.00	96%
Net present value (NNP)	N\$, 10 years @ 8%	1,841,600	1,995,300	5.70	108%

¹ Investment in one trophy hunting operation, by a private sector operator, as part of a joint venture agreement, applicable to both Torra and Puros conservancies, which benefit through employment and rentals/royalties.

² Financial returns to the hunting operation investor (net income and net present value) and to the community (salaries/wages).

³ Contribution of the investment to the national product (gross and net national product)

⁴ Values adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16

Table 5: Financial and economic values attributable to black rhino in two wildlife viewing lodge joint ventures, Torra and Puros conservancies, Namibia dollars (N\$), 2004

Measure	Units	Tora or Puros wildlife viewing lodge investments ¹			
		Basic values Without rhino	Value change with rhino	Value change per hectare	Percentage Change
Physical measures					
Conservancy extent	Hectares	352,200	352,200	352,200	352,200
Black rhino population	Head	20/0	20	20	20
Financial measures²					
Capital investment	N\$	2,044,800	8,500	0.00	0%
Turnover	N\$/annum	2,418,400	158,000	0.40	7%
Net income	N\$/annum	389,400	109,300	0.30	28%
Community income	N\$/annum	215,136	0.00	0.00	0%
Net present value	N\$, 10 years @ 8%	539,300	596,600	1.70	111%
Economic measures³					
Gross output	N\$/annum	2,275,900	148,700	0.40	7%
Economic costs	N\$/annum	1,091,700	40,500	0.10	4%
Contribution to GNP	N\$/annum	1,184,200	108,200	0.30	9%
Contribution to NNP	N\$/annum	851,100	108,200	0.30	13%
Net present value (NNP)	N\$, 10 years @ 8%	3,889,900	628,500	1.80	16%

¹ Investment in wildlife viewing lodge operations, as part of two joint venture agreements per conservancy with private sector operators, applicable to the Torra and Puros conservancies, which benefit through employment and rentals/royalties.

² Financial returns to the lodge operation investors (net income and net present value) and to the community (salaries/wages).

³ Contribution of the investment to the national product (gross and net national product)

4. Values adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16

Table 6 and Table 7 provide the consolidated pictures of all financial and economic impacts due to rhino use in Torra, and establishment and use in Puros. Reflecting the findings in Table 2 and Table 3 the increase in capital costs was low for Torra and very high for Puros. The annual financial turnover and economic gross output values figures increased by some 40% for both conservancies. The overall community income due to rhino increased by 118% in Torra, amounting to N\$2.7 per hectare or N\$47,632 per rhino “on the hoof” (US\$7,420 ⁵⁵), and by 42% in Puros, amounting to about N\$.00 per hectare or N\$17,038 per rhino “on the hoof” (US\$2,654 ⁵⁶). The difference was largely a result of the financial capital servicing cost in Puros. Overall community income due to rhino can be broken down to its components of salaries/wages (5% in Torra and 15% in Puros), Community profits (58% in Torra and 15% in Puros) and dividends (36% in Torra and 70% in Puros). The increase in salaries/wages would involve the creation of some 8 full time jobs in both

⁵⁵ Constant 2004 US\$ values

⁵⁶ Constant 2004 US\$ values

conservancies. The ratios between these components of community income can change depending on conservancy policy.

Table 6: Total of all financial and economic values attributable to full use of black rhino in the Torra conservancy, Namibia dollars (N\$), 2004					
Measure	Units	Total for Torra conservancy ¹			
		Basic values Without rhino	Value change With rhino	Value change per hectare	Percentage change
Physical measures					
Conservancy extent	Hectares	352,200	352,200	352,200	352,200
Black rhino population	Head	20	20	20	20
Financial measures²					
Capital investment	N\$	4,115,200	85,300	0.24	2%
Turnover	N\$/annum	4,436,100	1,724,600	4.90	39%
Net income	N\$/annum	660,100	778,800	2.21	118%
Community income	N\$/annum	805,037	952,650	2.70	118%
Net present value	N\$, 10 years @ 8%	1,927,800	8,746,200	24.83	454%
Economic measures³					
Gross output	N\$/annum	4,305,700	1,755,700	4.98	41%
Economic costs	N\$/annum	1,948,100	424,600	1.21	22%
Contribution to GNP	N\$/annum	2,357,700	1,331,000	3.78	56%
Contribution to NNP	N\$/annum	1,870,900	1,330,300	3.78	71%
Net present value (NNP)	N\$,10 years @ 8%	10,707,200	12,232,200	34.73	114%
¹ Aggregate values for the Torra conservancy, including the community's conservancy investment in rhino use (Table 2) and the associated joint venture trophy hunting (Table 4) and wildlife viewing lodge (Table 5) investments. ² Combined financial returns to the community conservancy investors and the associated joint venture hunting and lodge operation investors. ³ Combined contribution of the Torra conservancy and associated joint ventures to the national product (gross and net national product). 4. Values adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16					

The results of the economic analysis are interesting. The annual contribution of rhino to the national economy (in terms of value added to the net national product), increased by N\$3.78 per hectare or by N\$66,550 per rhino “on the hoof” for Torra (~US\$10,368 ⁵⁷), and by N\$0.17 per hectare or by N\$2,940 per rhino “on the hoof” for Puros (~US\$458 ⁵⁸). This difference was again the result of the high initial cost of rhino establishment in Puros. The ten-year net present value measure, which reflects a stream of net national product contributions as well as the accumulation of capital wealth (mainly rhino stocks), increases by N\$24.83 per hectare or by N\$611,610 per rhino “on the hoof”

⁵⁷ Constant 2004 US\$ values

⁵⁸ Constant 2004 US\$ values

for Torra (~US\$95,280⁵⁹), and by N\$8.82 per hectare or by N\$155,380 per rhino ‘on the hoof’ for Puros (~US\$24,206⁶⁰).

Table 7: Total of all financial and economic values attributable to establishment and full use of black rhino in the Puros conservancy, Namibia dollars (N\$), 2004

Measure	Units	Total for Puros conservancy ¹			
		Basic values Without rhino	Value change With rhino	Value change per hectare	Percentage change
Physical measures					
Conservancy extent	Hectares	356,800	356,800	356,800	356,800
Black rhino population	Head	0	20	20	20
Financial measures²					
Capital investment	N\$	4,115,200	12,443,500	35.33	302%
Turnover	N\$/annum	4,436,100	1,732,000	4.92	39%
Net income	N\$/annum	660,100	164,700	0.47	25%
Community income	N\$/annum	805,037	340,750	0.97	42%
Net present value	N\$, 10 years @ 8%	1,927,800	3,663,500	10.40	190%
Economic measures³					
Gross output	N\$/annum	4,305,700	1,763,500	5.01	41%
Economic costs	N\$/annum	1,948,100	1,704,600	4.84	88%
Contribution to GNP	N\$/annum	2,357,700	58,800	0.17	2%
Contribution to NNP	N\$/annum	1,870,900	58,100	0.16	3%
Net present value (NNP)	N\$, 10 years @ 8%	10,707,200	3,107,600	8.82	29%

¹ Aggregate values for the Puros conservancy, including the community’s conservancy investment in rhino establishment and use (Table 2) and the associated joint venture trophy hunting (Table 4) and wildlife viewing lodge (Table 5) investments.

² Combined financial returns to the community conservancy investors and the associated joint venture hunting and lodge operation investors.

³ Combined contribution of the Puros conservancy and associated joint ventures to the national product (gross and net national product).

4. Values adjusted to 2004 prices in Namibia dollars (N\$), when N\$1.00 was equal to (South African rand) R1.00, and US\$0.16

Thus the financial and economic values of black rhino differ, depending on whether there is a need establish rhino or not. This applies in the initial period, in this analysis, during the first ten years. Torra, with an already established stock, is able to benefit fully from use immediately, while Puros has first to recover the high costs of rhino establishment before it can benefit fully. In the first period, Puros enjoys positive benefits from rhino, albeit lower ones than Torra. The weight of the true economic gain in Puros during this period lies in the investment in stock. It is important to note that in Puros, in later years, with an already established rhino population in the conservancy, the financial and economic values for rhino would be similar to those measured in Torra. The analysis

⁵⁹ Constant 2004 US\$ values

⁶⁰ Constant 2004 US\$ values

above shows that in the arid escarpment areas on Namibia, investment in black rhino can contribute very positively to economic growth and community livelihoods. The analysis results would apply, for example, to both the Torra and Puros conservancies.

The positive values measured in this case study are highly likely to apply to less arid, semi-arid and sub-humid sites in other parts of southern Africa, such as those in Zimbabwe and KwaZulu-Natal. Our, previously undertaken, comparative financial and economic analyses for tourism activities would suggest that gains per hectare would be between four and eight times as high for these biologically more productive areas. Since most tourists currently do not appear to distinguish between white and black rhino, and because these other sites commonly have established populations of white rhino, the economic values would tend to be for "rhino" and not specifically black rhino.

7. THE EXTENT TO WHICH RHINO INFLUENCE CHANGE OF LAND USE TO WILDLIFE PRODUCTION

The Namibian Community-Based Natural Resources Management (CBNRM) Programme, described by NACSO (2004), was initiated in the 1980s with the primary aim of reversing the decline of black rhino and elephant in the north-west (Kunene region) of Namibia. In this it has been spectacularly successful, and populations of these two species have since increased substantially. The result is one of the few examples in southern Africa where black rhino numbers on communal land have been expanding. But the CBNRM programme has expanded to all communal lands in the country, and has resulted in large tracts of communal land being converted to wildlife production. The rhino was an important catalyst in attracting donor funds to the CBNRM programme in Namibia.

In Zimbabwe, du Toit (undated) states that the development of three "rhino conservancies" in the south-east Lowveld region was catalysed by the need for a co-ordinated approach towards the monitoring, protection and management of viable breeding groups of black rhino on commercial ranches. Conservancies are described as amalgamations of private land units, under the control of two or more landholders who collectively agree manage some or all of their natural resources (du Toit, 1994a). Devolution of authority of natural resource management from the state to individual landowners under the Parks and Wild Life Act (1975) provided a context for neighbours to develop negotiated agreements for the management and consumptive use of valuable wildlife populations that range over different properties (du Toit, undated).

The unreliable rainfall of 300-600 mm in the south-east Lowveld restricts the viable land use options. In particular, subsistence agriculture in the densely populated communal areas has led to environmental deterioration and few financial returns. Motivated by the limited agricultural potential of the area, the 3 387 km² Savé Valley Conservancy near Chiredzi has made a complete land-use transition from cattle ranching to wildlife operations. Complexity in the conservancy arises not only from the diversity of attitudes among the 24 landowners but also from the shift in government attitude towards commercial wildlife production and land ownership in the country (du Toit, undated).

In the mid-1980's Zimbabwe had a population of around 2,000 black rhinos, but the late 1980's and early 1990's saw a wave of rhino poaching in the Zambezi valley, and by 1994 there less than 300 remaining (du Toit, undated; de Alessi, 2000). Neither the government's dehorning operation, the use of radio-collars, nor the shoot-to-kill poaching policy (de Alessi, 2000), were sufficient, and efforts were made translocate rhinos to private ranches under a custodianship scheme. The appropriate authority status does not apply to certain protected species such as black or white rhino,

and therefore new custodians had no ownerships rights (du Toit, undated). The long-term viability of rhino populations requires not only effective security but also a sustained biological monitoring of individuals of known genealogies. Establishment of groups (20-30 individuals) of rhinoceros with an optimal sex ratio, desired age structure and with the injection of new genes through translocation of breeders into the population every 10-15 years, helps maintain maximum population growth as well as spreading risk through spatial dispersion of populations (Kock *et al*, 1999). The government spread the risk of conserving the rhino, while landowners could benefit from using the animals as a tourism attraction (du Toit, undated). The need for cooperation and the removal of wildlife fencing between neighbouring properties led to the Department of National Parks and Wild Life Management (DNPWLM) recognising "rhino conservancies" (du Toit, 1994).

The Zimbabwean rhino custodianship scheme was initiated in 1990, when the WWF and the Beit Trust (a private endowment trust) began to collaborate with the DNPWLM. Financial and technical support was provided to facilitate landowners' development of large rhino conservancies in three areas within the Lowveld (Savé Valley, Bubiana and Chiredzi River). The scheme was dependent on the willingness of landowners to formally compromise on land management with their neighbours and also the existing presence of rhino. Since black rhino live in consistent home ranges and have fairly regular movement patterns, the desire of potential conservancy members to retain the right to ranch cattle was not a constraint to rhino breeding. However, the use of ecotourism to make rhino conservation economically viable meant that the Rhino Conservancy Project (RCP) encouraged partial or full replacement of cattle ranching with wildlife (du Toit, undated). The RCP was effectively insurance policy against the rapid decline in rhino due to commercial poaching, and was prudent since the population collapsed from over 2000 to approximately 300 animals by 1992. Populations stabilised by 1994 with over half the surviving animals translocated to private land and the remainder placed into Intensive Protection Zones in National Parks (Kock *et al*, 1999).

The Beit Trust provided financial assistance for electric fencing and radio systems, while landowners made commitments to restock their land with wildlife. Conservancy agreements needed to ensure that properties equitably shared the risk and costs associated with wildlife re-stocking, and also regulate consumptive use to avoid conflict between landowners. Game count and quota setting systems were devised to address this (du Toit, undated). Signing the constitution effectively made the individual members responsible for all recurrent costs including the costs associated with rhino management. The members in each conservancy are collectively responsible for the costs of the conservator unit, with an estimated annual cost of between US\$69,360 and US\$106,670 for Savé⁶¹ (Kock *et al*, 1999). Although wildlife populations are built up and managed on an equitable and sustainable basis by a conservancy, each member may decide how they will derive maximum benefit from that wildlife. For example, some depend on safari hunting while others, are involved in both consumptive and non-consumptive activities (du Toit, undated).

A drought in 1992 coupled with environmental degradation due to livestock product led Savé Valley Conservancy members to question the wisdom of continuing to ranch cattle. The growth in nature-based tourism opportunities and the comparative economic advantage of wildlife over cattle for hunting was apparent. These pressures coupled with the positive experiences of working together drove the conservancy members to undertake a detailed scenario analysis of land use options, focusing on a potential shift from cattle altogether for wildlife and tourism (du Toit, undated).

An evaluation of cattle ranching and wildlife production conducted by Price Waterhouse *et al* (1994) report concluded that wildlife operations would generate about US\$ 8 per hectare in gross

⁶¹ In constant 2004 values

annual revenue⁶²: nearly double that of cattle operations. Also, the wildlife revenue could increase by 500% if the area becomes an established tourist destination, and while the return on capital would be 1-3% for cattle operations, it could reach 10-22% for wildlife. In addition, wildlife operations (based on low-volume tourism) would double the level of employment in the short-term, and quadruple employment (with higher average wages than cattle) in the long-term (du Toit, undated). de Alessi (2000) reported that financial considerations were the prime motivation for the formation of the lowveld conservancies. Official acceptance of the report by various government technical agencies led to an agreement between the Department of Veterinary Services (DVS) and the Savé Valley Conservancy to re-introduce of buffalo (buffalo had previously been eradicated because of their threat to cattle ranching through the transmission of foot-and-mouth disease). The introduction of about 300 buffalo in 1995 were seen as a key point in the transition of the conservancy towards wildlife, as veterinary concerns mean that buffalo are mutually exclusive to cattle. It is interesting to note that in 1997 the net income for the 10,000 ha Chishakwe Ranch was slightly over US\$3/ha⁶³ (approximately the same as the gross income from cattle estimated in the 1994 Price Waterhouse report) (du Toit, undated).

A study by Brown and Henry (1989) attempted to quantify the contribution of rhino to tourism operations. They found that on average visitors reported that 47.5% of their pleasure at Senuko in Savé was attributable to wildlife, and 40% of this pleasure (19% in total) was attributable to rhino in particular. Kock *et al* (1999) extrapolated this finding to assume that this rating of 'pleasure' was an indication of motivation to spend money at the lodge. He therefore calculated that US\$23,554 of Senuko's turnover of US\$123,967 was attributable to rhino⁶⁴. The validity of this extrapolation, especially in light of the guide responses from guides at Ongava and Phinda (see section 0), may be flawed, and the actual benefit at Senuko may not be as great as predicted.

The plight of the black rhino catalysed the formation of the conservancies, and the change in land use from livestock to wildlife production. The process has not only led to improved conservation and antipoaching efforts of cooperating landowners, but the population has grown at more than double the rate of those in smaller fenced areas in southern and eastern Africa. In part this is considered to be due to the presence with adequate forage within a large spatial area that allows rhino to establish home ranges without much intraspecies fighting (a major cause of mortality during re-introductions) (du Toit, undated). In 1999 the rhino population had reached 61 in Savé, 71 on Bubiana and 16 on Chiredzi River Conservancy. The desired optimal population target for Savé and Bubiana conservancies is 100 and Chiredzi 50 rhino (approximately 80% of carrying capacity) (Kock *et al*, 1999). Other introduced species have also benefited from the conservancies, with good growth rates seen in buffalo (>10% annually), giraffe and elephant. Critically endangered wild dogs, which require extensive home ranges, have also moved into Savé due to the abundance of suitable antelope prey and absence of other predators (e.g. lions and hyenas) (du Toit, undated).

However, in the run up to the 2000 general election, various coalitions of actors, gathered under the banner of 'war veterans', stepped up a previously low-level campaign of occupying commercial farms and some state-owned land. ZANU(PF), the ruling party, fought the election under the slogan 'Land is the economy and the economy is land'. Farm occupations and a 'fast-track' land reform process picked up momentum after the election, underpinned by a policy emphasis on the importance of small-scale peasant agriculture at the expense of white-dominated commercial agriculture in general, and the wildlife industry in particular (Wolmer, 2003).

⁶² In constant 2004 values

⁶³ In constant 2004 values

⁶⁴ In constant 2004 values

During May 2000 occupations began in Gonarezhou as the Chitsa people used the invasion of commercial farms to pursue their historical claim for land that they had been forcibly removed from, and driven by the need for access to grazing and hunting (Chamuba *et al*, 2003). By November 2000 areas of the park were being occupied, cleared and burned by residents of neighbouring communities (Sharman, 2001). Similarly, areas of the Savé Valley Conservancy and the Chiredzi River Conservancy had also been invaded, and there were reports that poaching and snaring had led to Savé losing more than 3000 animals, while 40% of Chiredzi had been destroyed by burning (Sharman, 2000). Settlers were able to proceed despite opposition from the DNPWLM and the Minister of Environment and Tourism (Chamuba *et al*, 2003). Tourism revenues in the region dropped dramatically. For example, land invasions on a portion of the Malilangwe Estate in 2000 led to the cancellation of the few tourism bookings that were held for the year. Total revenues generated were just over US\$150 000⁶⁵, or approximately 10% of what Malilangwe had anticipated (de la Harpe, 2001).

Despite the downturn in potential revenue from wildlife, Kock *et al* (1999) note that the costs of rhino conservation to private landholders are relatively high they face risks of political intervention, economic downturn and declines in tourism. Despite this the conservancies provide a strategy to avoid having all rhino susceptible to the administrative and financing threats faced by national parks. Kock *et al* (1999) state that multiple economic activities within conservancies spreads the business risk and makes them less susceptible to the dynamics of specific markets.

Kock *et al* (1999) calculated that the incremental operating costs attributable to rhino in Savé Valley to be between Z\$839,255 and Z\$1,290,712 (US\$69,360 and US\$106,670 per annum⁶⁶ [see Table 8]).

Total conservancy size	341,473 ha
Number of rhino	56
Total cost of scouts	Z\$2,152,575
Estimated % of scouts time on rhino	30%
Incremental cost – scouts	Z\$645,773
Cost of conservator unit	Z\$644,939
Estimated % of conservators time on rhino	30%
Incremental cost of conservator	Z\$193,481
Total incremental cost of rhino conservation	Z\$839,255 – 1,290,712
Total incremental cost per hectare	Z\$2,46 – 3.78
Total incremental cost per rhino	Z\$14,987 – 23,048

Source: Kock et al, 1999

Du Toit (undated) highlighted a number of factors that catalysed the (initially) transition from livestock to wildlife production and rhino conservation during the initial phases of the Savé Valley Conservancy in the early 1990's. These included:

- Wildlife laws and decentralisation of authority over wildlife that provided landowners with sufficient latitude to utilise the wildlife on their properties and to develop co-management arrangements with their neighbours;
- Government acceptance that wildlife production and safari hunting as a legitimate form of land use and source of income on commercial ranches;

⁶⁵ In constant 2004 values

⁶⁶ Nominal data

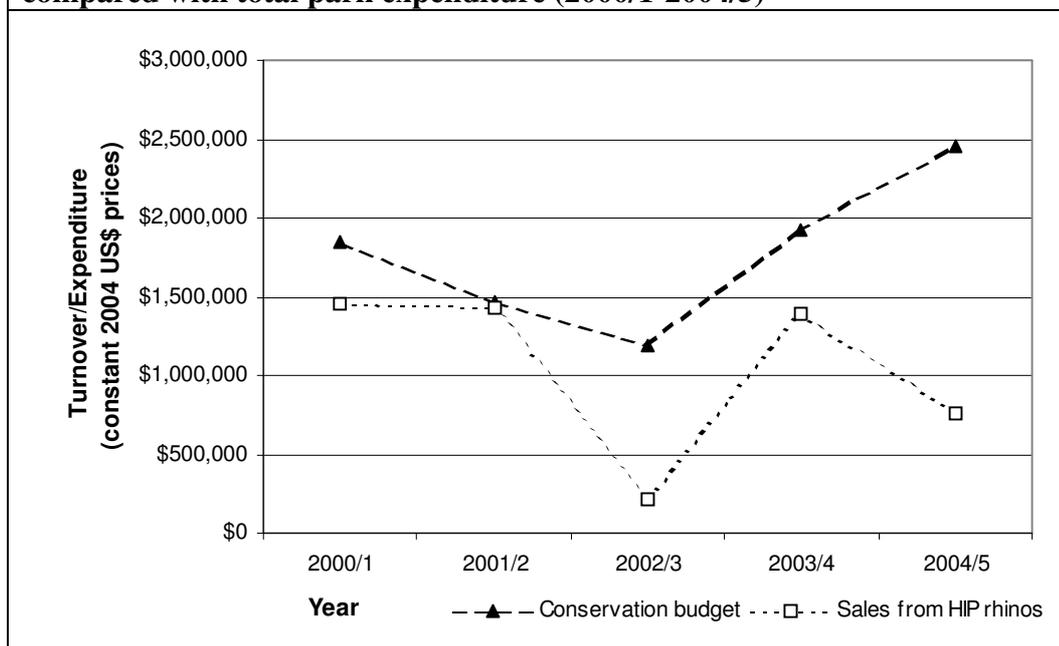
- A custodianship scheme that allowed certain endangered species such as black rhino to remain under tight state control but restocked into commercial wildlife operations, so encouraging landowners to work together to conserve these species and boosting local tourism activities;
- Financial assistance from donors at key stages to facilitate the transition from cattle ranching to wildlife production, although Kock *et al* (1999) noted that the limited number of donors was actually constraining progress.

8. DISCUSSION

Do rhino add value to wildlife operations in state and private areas?

Analysis of black and white rhino populations at Hluhluwe-Imfolozi indicated that the population of black rhino was declining by nearly 5% per annum while the population of white rhino was increasing by nearly 4% per annum. The average auction price for both Hluhluwe-Imfolozi's black and white rhino has tended to decline since 2000. By 2004 the average auction prices for Hluhluwe-Imfolozi's animals were R142,000 for a black rhino (~US\$22,199⁶⁷) and R112,000 for a white rhino (~US\$17,377⁶⁸). As a proportion of total turnover sales of rhino were on average equivalent to 60% the park's expenditure between 2000/1 and 2004/5, with a high of 98% in 2001/2 (see Figure 18).

Figure 18: Total real turnover for Hluhluwe-Imfolozi's rhino sales compared with total park expenditure (2000/1-2004/5)



Data Source: KZN Wildlife Game Capture Unit game disposal returns

Note: Assumes all rhino sales took place in May of each year; HIP's financial year runs from 1 April to 28 May.

Although this comparison appears to provide a stark contrast with Emslie and Brooks' (1999) finding that game sales from the Hluhluwe-Imfolozi Park represented 22% of the total cost of running the Park in 1998/99. The park could potentially have generated more revenue through

⁶⁷ Constant 2004 US\$ values

⁶⁸ Constant 2004 US\$ values

rhino sales, but the internal translocation and donation program that has re-introduced or supplemented populations in other reserves, has meant the park has effectively waived an additional US\$3.685 million⁶⁹ in turnover since 2000 (~). Although the revenue generated by the park does not accrue to the park itself, but instead accrues to KZN Wildlife as a provincial organization, it is clear that sales of rhino could make a substantial contribution to covering their management costs in addition to other conservation and administrative expenditure. In actual fact, it was clear that some of the conservation and monitoring activities undertaken at the park are financed by donors rather than by tourism income, because the park's revenue is diverted to the central provincial budget. The income from negotiated live sales of white rhino at Phinda, by contrast to Hluhluwe-Imfolozi, do accrue to the enterprise and provide a net financial benefit (US\$221,041⁷⁰ since 2002).

Palmwag and Phinda's activities indicated a clear demand for non-consumptive rhino tourism, through rhino tracking and darting activities. In the special case of Palmwag, all guests participate in the tracking of desert rhino in an initiative that finances their monitoring by Save the Rhino Trust (SRT). Here the rhino not only add value to the tourism enterprise, but are effectively the reason that the enterprise exists. Here the tourism experience is used directly to finance conservation monitoring activities. At Phinda tourist's participation in rhino darting activities finances the process of inserting identification chips into the horns, but actually constitutes a very small proportion of the total tourism turnover (0.7% in 2003/4).

Previous demand studies, conducted among visitors to Hluhluwe-Imfolozi (Sherifs, 2004) and among guides at Phinda and Ongava, reveal that visitors want to see rhino. But there is no clear evidence to suggest that the presence of rhino directly influences a photographic tourist's decision to visit these locations in particular, or to pay more for that experience. Therefore it is very difficult to estimate the proportion of tourism turnover in these locations that is directly attributable to rhino, unlike the evaluation by Kock *et al* (1999) in Savé. We used these data to ascribe an estimated proportion of 7% of tourism value to rhino in the Torra conservancy. Further research and application of a detailed contingent valuation method among tourists regarding rhino and other wildlife species is needed to more accurately draw out the actual willingness-to-pay for rhino viewing. This should have a high priority, not only with regard to rhino, but for other flagship species as well.

The case of Phinda's black rhino is of interest because they act as custodians of the population on behalf of KZN Wildlife. Therefore KZN Wildlife's waiver of revenue of live sales has effectively contributed to the conservation significance of a private sector reserve (while the translocation costs were donated by WWF). Phinda will pay for the management of the rhino over the next 25 years and will split the proceeds of any offspring with KZN Wildlife. Phinda has yet to generate any direct financial benefit from the black rhino (e.g. through specialist tracking activities) but has incurred capital expenditure as a consequence, and will have ongoing costs of additional expertise, staff wages and equipment during the course of the agreement. Revenue from sales of the progeny that Phinda receives will not be sufficient to offset the costs and therefore other sources of income will be required to support their management.

Implications for trophy hunting rhino were not explored at Phinda, Hluhluwe, Palmwag or Ongava, as no information regarding such activities came to light. However, since South Africa and Namibia now have allocations under CITES to hunt and export trophies of several black rhino per year, this does provide an additional potential source of consumptive revenue. However, discussions with stakeholders from these sites indicated a reluctance to hunt black rhino, especially in light of financing by donors such as the WWF and conservation programs like the Black Rhino Range Expansion Project.

⁶⁹ Constant 2004 US\$ values

⁷⁰ Constant 2004 US\$ values

The presence of black rhino at Phinda and Hluhluwe-Imfolozi has had educational and livelihood benefits for local people. Environmental education financed by the Africa Foundation and WWF respectively has raised awareness of rhino conservation issues locally. Nearly 150 children have undertaken rhino-oriented conservation lessons at Phinda since they became custodians. With regard to local livelihood benefits, Phinda has employed 3 local people to work on the monitoring of their black rhino, and so contribute an additional US\$17,722⁷¹ into the local community per year. In addition, the rhino camp at Palmwag employs 19 people and 4 SRT personnel from all over Namibia (it was not determined how many were local). No operational expenditure on other products or services directly related to rhino were identified.

In conclusion, this evaluation indicates that both black and white rhino provide a net benefit to both state and private protected areas through both consumptive and non-consumptive use. The finding for the financial and economic analyses for the Torra and Puros conservancies, on communal land in arid Namibia (0, above), would tend to confirm this. As in that case, and not-surprisingly, consumptive use generates more income when compared with non-consumptive use.

However, further research would ideally look specifically at locations that have operated tourism both before and after having any rhino populations. This study was limited as a suitable study site, that fulfilled this criterion and had data readily available, could not be identified. As an alternative, sites that had black rhino introduced to properties where white rhino already existed, or where both white and black rhino populations had been located for extensive periods were evaluated.

In addition, it is well known that rhino horns continue to grow back on de-horned animals, requiring regular trimming to reduce potential gains to poachers. This constant growth makes it possible to farm rhino horn by harvesting it at repeated intervals during the rhino's life (Emslie and Brooks, 1999). Due to CITES rules governing trade in rhino horn, international trade in horn from de-horned rhino is not permitted, and therefore the opportunity costs of this potential source of sustainable revenue could be explored in future studies.

Based on our analyses of financial and economic rhino values in the Torra and Puros conservancies (0, above) it can be expected that rhino do contribute positively to wildlife operations on both state and private land. More specific research into the costs and benefits of rhino conservation and use in these settings is required.

Does the protection and monitoring needs of rhino confer blanket protection for other wildlife components?

In 2003 Hluhluwe-Imfolozi had a population of 301 black and 1897 white rhino. Since the reserve conducts its conservation management with the objective of reserve integrity, rather than for the particular protection and management of any species in particular, the reserve considered that its entire budget was attributable to rhino conservation. Expenditure on antipoaching activities is reportedly operating at its lowest potential level, and if it was reduced further park representatives believe that there would be increasing risk to the rhino population. Therefore the conservation management of rhino also contributes to the conservation of other fauna found on the reserve, which include elephant, lion, leopard, wild dog and buffalo. Stakeholders reported that on average 1.5 white rhino are lost annually to poachers, and that poaching of other species is at a relatively low level.

⁷¹ Constant 2004 US\$ values

Not all wildlife-monitoring activities at the reserve (including for black and white rhino) are financed by KZN Wildlife. Donations and volunteers orchestrated by the Earthwatch Institute provide regular support for this activity. In addition to monitoring populations of rhino, they also record populations of other species such as wildebeest, giraffe, waterbuck, warthog, nyala, kudu and impala.

Conservation management has a direct impact on the livelihoods of local people, and 67% of the conservation staff in Hluhluwe-Imfolozi live in communities within 20-30 km of the park.

Further research comparing locations that have had introductions of new rhino populations would reveal the extent to which expenditure on wildlife management and levels of poaching had changed as a consequence.

Do rhino contribute to community-based tourism and rural livelihoods?

The comparative analysis of the Torra and Puros conservancies in Namibia revealed that there were substantial differences in the range of economic activities, number of jobs and revenue generated. Although Torra has black rhino populations that tourists may observe, while Puros does not, it is not valid to state that the reason Torra has been more successful so far is directly due to the presence of rhino. Other factors such as marketing, the longer time in which Torra has been registered, and the greater donor inputs Torra has received, are all likely to have played a major role, and it was not possible to determine the significance of black rhino by comparison of performance.

In the Torra conservancy, it will be possible to generate very significant new community benefits from the rhino, given the results of the analysis in 0, the potential for hunting of black rhino as part of the CITES allocation, and the potential for introduction of live sales and limited guided rhino tracking. In Puros this would also be possible but initially to a lesser extent, due to the need to invest capital on rhino establishment. The increases in community income, from rhino, in terms of conservancy dividends, wages/salaries and community profits, would be very high and well worth the investments required (Table 6 and Table 7). The same would apply to most conservancies in north-western Namibia.

Such benefits to communities from investment in rhino conservation will depend to some extent on growth in the markets for rhino use products (viewing tourism, live animals, trophy hunts, and guided tracking). Expansion in rhino use would have to take place within overall growth in demand for the products if prices for these products are not to fall. Growth in demand for wildlife viewing has grown very strongly in the 1990s and it is likely that at least some growth in overall demand will continue. The fact that no black rhino hunting has been allowed, and the likelihood that this will continue to be permissible, means that growth in rhino hunting demand should grow very strongly. This should also then apply to the induced demand for live rhino stocks, so that live rhino demand should grow. Guided rhino tracking along the lines of the operational model already demonstrated successfully at Palmwag, can also be expected to experience growth in demand. However this form of use needs to be strictly controlled to avoid disturbance of rhino.

Evaluations of the attitudes and perceptions of people living in conservancies near Torra (#Khoadi-//Hoas, //Huab and Omatendeka) by Uri-Khob (2004) certainly indicate a general support for economic activities based on rhino, and for their re-introduction into areas of their historical range. Plans for the re-introduction of rhino should involve appropriate cost-benefit analyses and market studies, to ensure that re-introduction can enhance community livelihoods in the best way.

As stated, the positive benefits to community livelihoods described above, should be easily replicated among communities in other parts of southern Africa. Here benefits per hectare will likely be much higher. It can be concluded that rhino do and can contribute significantly to community livelihoods.

Have rhino catalysed the change of land use from livestock to wildlife?

Namibia's community-based natural resource management programme began in the north-western communal lands in the 1980s, and it was initiated with the intention of reversing the ongoing decline, due to poaching, of rhino and elephant in that part of the country. As described above this programme has gone from strength to strength, and now embraces a major portion of all communal lands in the country. The result of this programme is that large areas are now allocated to wildlife uses, alongside livestock. The black rhino played pivotal role in providing the motivation for this programme.

A desk study on the evolution of the Savé Valley conservancy indicated that rhino had catalysed the change in land use from livestock to wildlife. Various factors combined to bring about this change, which included an enabling political environment and legislation, support by WWF and appropriate financial assistance, freedom for conservancy members to explore options for revenue generation, the unsuitability of the habitat for livestock production, historical degradation caused by livestock, low rainfall conditions and co-operation between neighbouring landowners. The conservancies certainly contributed positively towards the protection and population growth of rhino in the early 1990s.

The conservation management issues and the costs and benefits associated with the rhino in more recent years, within the context of political and land-tenure instability in Zimbabwe, were not ascertained in detailed. This study was limited by the use of only three documented sources of information, which although of high quality, perhaps do not provide adequate perspective or the basis for sufficient critical analysis of the situation. Given the time and financial constraints of this pilot study, a site visit was not made, and it is recommended that interviews with key stakeholders and especially with representatives of local communities should be made if this issue is to be addressed thoroughly.

Implications of consumptive and non-consumptive uses of rhino within the SADC region

Non-consumptive use of rhino through wildlife viewing tourism is already well established and accepted in the SADC region. As described above, however, it is extremely difficult to get reliable data on the proportion of tourism value, which is attributable to rhino. Estimates made using data on the listing of attributes, given by tourists in open-ended questionnaire questions, as we did for the Torra conservancy analysis are unreliable. More research is needed on this. Nevertheless, financial and economic values due to rhino tourism appear to be very significant.

Consumptive live rhino sale is also well established in South Africa and Namibia, although sale of black rhino is still somewhat tightly controlled by the state. The value of live rhino sales has also so been shown to be significant (see above). The other consumptive use of rhino that now appears to be feasible is trophy hunting. This is already practised for white rhino, and CITES has recently approved limited quotas for black rhino hunting in South Africa and Namibia. Due to the very high un-met demand, this has considerable potential to generate income. Apart from the pecuniary benefits, trophy hunting of Black rhino should also improve herd management by reducing the surplus male population (Leader-Williams et al., 2005).

Both consumptive and non-consumptive uses of rhino have potential to generate significant amounts of economic income and to contribute to the livelihoods of rural people. As land uses, they tend to be complementary and not mutually exclusive. The results above, and general studies (Barnes, 2001) have shown that combinations of both non-consumptive and consumptive uses will generate maximum benefits. To provide the incentives needed for massive investment in rhino conservation, all possible uses should be explored for rhino.

Politically there is some opposition to hunting as a form of land use, and this definitely applies to rhino, as an endangered category of wildlife. The negative international political impact of animal rights groups' campaign against rhino hunting needs to be countered with efforts to maximise the benefits of hunting to livelihoods and economic growth. These local and national incentives will, as has happened in the CBNRM programme in Namibia, offer the best chance of further investment in the conservation of rhino. The proposals of the IUCN African Rhino Specialist Group (Leader Williams, et al., 2005) should be adhered to, so that sustainability of hunting can be ensured, and the damage caused by political opposition minimised.

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10. APPENDIX 1: QUESTIONNAIRE FOR TOURIST GUIDES

SADC Regional Programme for Rhino Conservation

Questionnaire for guides on demand for rhino viewing

April 2005

Ongava Private Game Reserve, Namibia

We are conducting a study to evaluate the demand from tourists to see white and black rhinos and would like your help! Please could you complete the questions below in relation to your personal experience with guests at Ongava PGR.

1. Your name	
2. When did you start working as a guide at Ongava?	
3. How many guests do YOU take on game drives in an average month?	
4. In an average month how many of YOUR guests state that they want to see rhinos?	
5. Do YOUR guests know the difference between BLACK and WHITE rhinos before they arrive?	
6. In an average month how many of YOUR guests specify that they want to see WHITE rhinos in particular?	
7. In an average month how many of YOUR guests state that they want to see BLACK rhinos in particular?	
8. In an average month how many of YOUR guests state that the reason they came to Ongava was to see rhinos?	
9. In an average month how many of YOUR guests state that the reason they came to Ongava was to see WHITE rhinos?	
10. In an average month how many of YOUR guests state that the reason they came to Ongava was to see BLACK rhinos?	
Any further comments that may assist us	

Thank you!

11. APPENDIX 2: INFLATION AND EXCHANGE RATES USED FOR CONSTANT 2004 VALUES

INFLATION ADJUSTMENTS

YEAR	South Africa	Namibia
	2004 Factor	2004 Factor
1990	2.92	3.72
1991	2.53	3.39
1992	2.22	3.08
1993	2.02	2.80
1994	1.86	2.55
1995	1.71	2.32
1996	1.59	2.11
1997	1.47	1.92
1998	1.37	1.74
1999	1.30	1.59
2000	1.24	1.44
2001	1.17	1.31
2002	1.07	1.19
2003	1.01	1.09
2004	1.00	1.00
2005	0.98	1.08

YEAR	EXCHANGE RATES
	R to US\$
1990	0.39
1991	0.36
1992	0.35
1993	0.30
1994	0.28
1995	0.28
1996	0.23
1997	0.22
1998	0.18
1999	0.16
2000	0.14
2001	0.12
2002	0.10
2003	0.13
2004	0.16
2005	0.16