Black rhino conservation in Tanzania: translocation efforts and further challenges

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Abstract

Tanzania had many black rhinos (*Diceros bicornis*) in the 1960s but was hit by ruthless poaching between the 1970s and late 1980s. From the 1990s, the country declared a war against unscrupulous poachers in order to conserve the few remaining rhinos. The current strategy is to reintroduce black rhinos that were originally from East Africa in order to increase genetic diversity. Three translocations of black rhinos between 1997 and 2001 involved 10 animals from South Africa, two of which were reintroduced to Ngorongoro Crater and eight to Mkomazi National Park. In 2007, two black rhinos from Port Lympne Wild Animal Park, UK, were introduced into a sanctuary adjacent to Ikorongo-Grumeti Game Reserves. In June 2009, three black rhinos from the Czech Republic were translocated to Mkomazi National Park. Another translocation operation is expected to begin in May 2010 whereby 32 black rhinos will be translocated into the Serengeti ecosystem from Thaba Tholo, Thabazimbi, South Africa. Although the first five translocation operations went well, the challenge is the management of the reintroduced rhinos amid the growing social-ecological pressures affecting protected areas. Management authorities should consider the recommended sex ratio for rhino populations to avoid excessive male aggression.

Keywords: Black rhinos, conservation, poaching, translocation

Résumé

La Tanzanie avait beaucoup de rhinocéros noirs (Diceros bicornis) dans les années 1960 mais elle a été touchée par un braconnage impitoyable entre les années 1970 et la fin des années 1980. Depuis les années 1990, le pays fait la guerre contre les braconniers sans scrupules en vue de conserver les quelques rhinocéros qui restent. La stratégie actuelle est de réintroduire des rhinocéros noirs qui étaient originairement d'Afrique de l'Est pour amplifier la diversité génétique. Trois translocations de rhinocéros noirs entre 1997 et 2001 concernaient 10 animaux provenant d'Afrique du Sud, deux d'entre eux ont été réintroduits dans le Parc national du cratère de Ngorongoro et huit dans le Parc national de Mkomazi. En 2007, deux rhinocéros noirs provenant du Parc de la faune de Port Lympne, au Royaume-Uni ont été introduits dans le sanctuaire adjacent de la Réserve naturelle d'Ikorongo-Grumeti. En juin 2009, trois rhinocéros noirs provenant de la République tchèque ont été transférés au Parc national Mkomazi. Une autre opération de translocation par laquelle 32 rhinocéros noirs seront transférés dans l'écosystème Serengeti à partir de Thaba Tholo, Thabazimbi en Afrique du Sud est prévue de commencer en mai 2010. Bien que les cinq premières opérations de translocation se soient bien passées, le défi reste de savoir comment gérer des rhinocéros réintroduits au milieu de pressions socio-écologiques croissantes qui affectent les aires protégées. Les autorités de gestion devraient examiner la sex-ratio recommandée pour les populations de rhinocéros pour éviter une agression mâle excessive.

Introduction

All six rhino species remaining on the planet, three from Asia—Sumatran rhino (*Dicerorhinus sumatrensis*), the Javan rhino (*Rhinoceros sondaicus*) and the Indian rhino (*Rhinoceros unicornis*)—and three from Africa—the northern and southern white or square-lipped (*Ceratotherium simum*) and the black rhinos (*Diceros bicornis*)—are threatened with extinction from poaching and habitat degradation (Hutchins and Kreger 2006; www.rhinos-irf.org).

Conservation measures in Africa have placed a high priority on conserving large, open ecosystems and species populations (Western 2003). Kenya and Tanzania, for instance, have set aside 8% and 28% of their land for wildlife conservation, respectively (Western 1987; WPT 1998; Meghji 2002).

In Tanzania, before the 1960s, the black rhino population ranged from Mkomazi Game Reserve (now upgraded to a national park) in the north-east, to Lake Victoria in the north-west and from Selous Game Reserve in the south to Ruaha National Park in central Tanzania (Frame 1980). The black rhino population in Serengeti National Park alone was about 700 individuals in 1974 (Frame 1980). In areas with low conservation status, especially in the sparsely inhabited hunting concession areas, serious illegal hunting was evident (Leader-Williams and Albon 1988). However, in the 1980s the rhino population declined drastically due to high poaching pressure and by the 1990s only three isolated small populations remained: Ngorongoro Crater, Serengeti National Park and Selous Game Reserve (Makacha et al. 1982; Sinclair 1995). Loss of all these animals in less than a decade without strong intervention from the national and international communities is a regrettable event in Tanzania's conservation history.

The world's economic crisis of the 1980s made most African governments unable to institute the conservation strategies that had been laid down in their strategic plans, which caused anti-poaching patrol days to drop by 60% compared with those performed before the 1970s, and immensely reduced capacity to counter-poaching (Makacha et al. 1982; Sinclair 1995).

In the Serengeti Ecosystem, two major factors contributed to the high poaching activities that affected the rhino population in the 1980s: (i) increasing anthropogenic activities close to the boundaries of the protected areas (ii) increasing human population resulted in the blockage of wildlife corridors (Makacha et al. 1982). Lack of connectivity among protected areas is probably suppressing the genetic diversity of the endangered species (Nevo et al. 1984).

Currently the Tanzanian government is firmly committed to the conservation of the few remaining black rhinos in the country (and other wildlife species in general) with the Ministry of Natural Resources and Tourism through its Wildlife Division, which plays a co-ordinating role in the rhino conservation projects in the country.

The efforts to conserve black rhinos in Tanzania

The Tanzanian government took a bold action to reduce the rampant poaching when the rhino population approached extinction level. In order to create public awareness on the massacre of rhinos, the government launched a special operation in 1989 called *Operesheni Uhai*, a Swahili phrase meaning 'operation save life', which coincided with the world ban on ivory trade (Sinclair 1995). The operation involved the army, police, national service, game officers, game rangers, game scouts and militiamen. Radio and newspapers were used to inform the public on the seriousness of rhino poaching and importance of 'operation save life' and its implication for conservation of black rhinos, elephants and wildlife in general. During the operation many illegal immigrants from Somalia who were at the forefront in the ruthless and illegal killing of rhinos and elephants were repatriated and many illegal arms were confiscated. The remaining local population of rhinos in Ngorongoro Crater, Serengeti National Park and Selous Game Reserve were given special monitoring systems and law enforcement was strengthened in line with donors' support.

In 1997, in attempt to increase the number of rhino populations in Tanzania, conservation organizations translocated some original East African black rhinos from South Africa (SA). Frankfurt Zoological Society (FZS) brought two female rhinos in Ngorongoro Crater, and the George Adamson Wildlife Preservation Trust (GAWPT) brought four black rhinos into Mkomazi Game Reserve. In 2001, the GAWPT brought four more rhinos into the same game reserve making a total of eight rhinos, four

females and four males. Unfortunately in 2003 one young male (Badger) that was brought in 2001 died from a long-standing traumatic injury assumed to have been sustained in South Africa prior to translocation. In June 2009, the GAWPT translocated three more rhinos (one female and two males) from a zoo in the Czech Republic to Mkomazi National Park.

In 2001, 10 black rhinos wandered from the Maasai Mara National Reserve in Kenya into the northern part of Serengeti National Park and established a refuge, probably due to some disturbance in the Maasai Mara National Reserve from human encroachment on dispersal rangeland (Norton-Griffiths 2007). This may also have been an indication that poaching pressure in the northern Serengeti had declined following the reinforcement of anti-poaching patrols by the park authorities. At the beginning of 2008, two black rhino spoors were observed in Kiteto/Simanjiro in the south of the Maasai steppes (F. Mremi, unpublished) suggesting that there were few unknown individuals in remote areas. These areas are potential habitats for future reintroductions and therefore, the strengthening of law enforcement will be essential in these open areas.

A new conservation organization in the Serengeti ecosystem (Singita-Grumeti Reserves Ltd) based at Sasakwa, adjacent to Ikorongo-Grumeti Game Reserves has a long-term plan to translocate black rhinos into the Serengeti ecosystem and is also committed to supporting wildlife conservation in that ecosystem. The first two rhinos, which were born in a zoo (Port Lympne Wild Animal Park, UK), arrived on 12 June 2007 and were introduced into a sanctuary at Sasakwa, adjacent to Ikorongo-Grumeti Game Reserves. The two rhinos have adapted very well to free-ranging and browsing on natural forage materials. In 2006 the Singita-Grumeti Reserves Ltd acquired 32 black rhinos from a private game ranch, Thaba Tholo, Thabazimbi in South Africa. Preparation for the translocation of these rhinos is currently in progress and shipment, which is scheduled to begin at the end of May 2010, is expected to take about three years (Emile Smidt and Pete Morkel pers. comm. 2009). By the time the translocation is completed, the total number of rhinos will probably exceed 32, including newborn calves. All rhinos from SA, UK and the Czech Republic are descendants of black rhinos originally from East Africa (subspecies *D. b. micheali*).

Home range

Frame (1980) estimated the home ranges of black rhinos in the Serengeti to be between 40 and 133 km^2 with much overlap, from 25% to 100% regardless of sex, and some sharing the same home range. At the beginning of 1992, the Serengeti rhino population was restricted to the area around Moru Kopjes. With the latter increase in population, the rhinos have begun to extend their range. When the rhinos move as far as the northern part of central Serengeti beyond Simba Kopjes, the game rangers have been required to push them back. In Ngorongoro Crater, on several occasions, rhinos, especially bulls, have left the Crater in search of new habitat or to escape from frequent aggression and fighting for territory. In 1998 a female rhino (Patricia) went out of the Crater and has not returned (T. Amiyo, pers. comm. 2002). Rhino spoor near Olduvai Gorge has been observed, suggesting that the rhino is probably still alive. Once, in 2002, a rhino was seen in the area but it disappeared prior to identification. In 2004 a young bull Mike IV (Mtoto wa Vicky) left the Crater but was immobilized about 100 km away, near Lake Eyasi, and brought back into the Crater. In the same year another bull, Mike II (Runyoro), went up to the Crater rim after a fight with Mike I (John), and a similar event happened to Mike III (Mikidadi).

Pushing the rhinos back to Moru Kopjes or to the Crater will probably not be a permanent solution since the number of individual rhinos is increasingly creating a demand for more space for browsing and avoiding frequent aggression. Frequent pushing back of rhinos when they move out of their original areas causes stress, which may have a negative effect on breeding success, especially for small populations that are likely to be subjected to an inbreeding problem (Miller 1994). The conservation authorities need to be proactive in establishing more habitats and increasing security for the rhinos, and restricting human activity in these areas in anticipation that the dispersing rhinos from Moru Kopjes and Ngorongoro Crater will likely colonize the new habitats.

Breeding success of rhinos

For eight years after 1997, when the first batch of six rhinos was translocated, the Mkomazi reintroduced rhinos did not breed despite the presence of three

males and four females, a sex ratio which is similar to what was observed in free ranging rhinos in the Serengeti (Frame 1980). Eventually, in 2005 a new calf was born at Mkomazi after eight years without breeding success. To date three females out of four have calved successfully, although one that was born in June 2006 died on 3 March 2008 from a suspected snake bite.

Infertility problems in female rhinos (particularly in zoos) can be the result of genital tumours, polyps, ovarian atrophy and ovarian cysts combined with scar tissue replacement. These problems arise when the female rhino fails to become pregnant before an excess of (frustraneous) sexual cycles damages the uterus and ovaries. Permanent infertility brought about by such damage is called 'Asymmetric Reproductive Aging' (Hermes et al. 2004). In males infertility can be due to atrophic testicular parenchyma or degeneration (Hermes et al. 2004; 2006). The delayed breeding in Mkomazi rhinos is speculated to be due to infertile bulls (too young or socially depressed) that were accidentally introduced with the adult females (Hoffman and Parsons 1991; Reinhardt et al. 1995). This situation caused reproductively healthy females to remain unmated until the males became sexually active. However, the accumulation of frustraneous cycles did not reach an extent of causing damage to the ovaries of reproductively healthy females. In the Ngorongoro Crater, a female rhino (Fausta) over 40 years old has never calved but the cause of her reproductive problems is not known. In Mkomazi it is hoped that the remaining female will not experience such reproductive problems and will breed in the near future. The habitat quality in Mkomazi is suitable for black rhinos and is the best in the country (M. Hofmeyr, pers. comm. 2002).

In Ngorongoro Crater, the dominant bull, Mike I (alias John), born in 1981, has performed very well and most of the calves born are females. As a result of its dominance, it has defeated the other two adult bulls (Mike II and Mike III) and pushed them up to the Crater rim. However, there is a concern over inbreeding as it has mated with his daughters and granddaughters (Dr Pete Morkel, pers. comm. 2004). Although inbreeding among the Crater rhino population has not been genetically proven (Nevo et al. 1984; Soulé 1987), a Population Viability Analysis (PVA) model is suggested in order to establish the viability of the Crater rhino population if new genes from unrelated individuals are introduced, from outside given that natural catastrophes (drought and infectious diseases) will continue to happen. A similar scenario is likely to face the local rhino population in Serengeti National Park (the Moru Kopjes population), because the population started with only two females and one bull and has now reached a population of about 20 individuals.

The translocation of 32 black rhinos by Singita-Grumeti Reserves Ltd into one ecosystem is likely to compromise the ability of management authorities to provide adequate protection to both indigenous and introduced populations. However, it could be a recipe for preventing the inbreeding problem in these small isolated rhino populations through introduction of new genes.

The Selous Game Reserve's rhino population was being monitored by the Rhino and Ecosystem Monitoring and Conservation Project, which, unfortunately, is no longer operating. Due to the extensive area in the Selous ecosystem (over 50,000 km^2), it is likely that interactions between females and different bulls is more common than in the Ngorongoro Crater, which is a small area (250 km^2), where only one bull is dominating the range and denying other bulls regular contact with females (Frame 1980). Since the female rhinos in Mkomazi are fertile and currently breeding well, it will be a wise decision to relocate two bulls from Mkomazi to Ngorongoro Crater and take the dominant bull, Mike I, and another to Mkomazi to enhance breeding; at the same time the move will eliminate the possibility of inbreeding depression in the Crater by giving other bulls the chance to introduce new genes in the population. However, there then arises the logistical challenge of managing the excess bulls in the northern isolated small populations.

Diseases

Diseases have not been a problem for rhinos in Tanzania for many years, except in August 2000, a female calf and a breeding female died of an unexplained disease in Ngorongoro Crater. The calf had high tick infestation and the skeletal remains of the adult female had signs of long standing fractures in the ribs. From the observation it was speculated that they probably died from a tick-borne disease and traumatic injury respectively. In 2001, two adult breeding females died from babesiosis, a tick-borne disease, in an interval of 10 days (Nijhoff et al. 2003). The disease outbreak forced the management

team to convene an *ad hoc* meeting for rhino experts, veterinarians and ecologists who decided to provide a chemoprophylactic treatment to all the rhinos in the Crater as a temporary measure to abate the problem (Fyumagwa et al. 2004). The underlying cause of the problem was high tick infestation and nutritional stress.

There have been no reports of disease problems among the other two rhino populations at Selous Game Reserve and Serengeti National Park, which is a sign of healthy rhino habitats. In March 2008 one of the newborn rhino calves in Mkomazi National park that was born in June 2006 died after a short illness and the cause of mortality was suspected to be snake bite.

In November 2002 there was a vast regrowth of *Amaranthus hybridus* and *A. spinosus* in the Crater after the short rains and in the following month a large part of the Crater grassland was covered by *Amaranthus* species. These plants attracted rhinos to concentrate in such areas for browsing. In the same month, December 2002, black rhinos were observed to pass profuse watery diarrhoea, a sign of infection. This was initially observed in a four year-old weaned bull calf (Vicky's calf) and few days later the entire population was exhibiting the symptoms. A veterinary assessment of the condition focused on the general behaviour of the rhinos, their location, their response to approaching vehicles and to other animal species; plus attention was paid to the condition and type of browsing materials. In addition, the colour of their urine and faeces were also assessed for possibility of tick-borne infection such as babesiosis, which is characterized by red frothing urine and diarrhoea with dark faeces, in additon to high fever and loss of appetite. Nine black rhinos, two of which were calves, were closely examined including the calf that was first to exhibit the symptoms. All rhinos were bright, responded well to stimuli, had good appetites and were actively browsing on *Amaranthus hybridus* and *A. spinosu*s, which were abundant and ubiquitous in the Crater. These plants seem to be palatable to rhinos and other herbivores but, as they contain very little crude fibre, they are probably rapidly digested and passed out as watery faeces.

Predation

The natural behaviour of a lactating black rhino's calf is for it to follow its mother, contrary to a lactating white rhino that moves with its calf in front. This black rhino behaviour subjects the calf to a higher risk of predation from a stalking predator than that of a white rhino. This problem is considerable in the Ngorongoro Crater where the spotted hyena (*Crocuta crocuta*) population is very high at approximately 400 in an area of 250 km^2 (Honer et al. 2006). Despite the presence of a high number of other herbivores (approximately 25,000), hyenas eagerly pursue newborn rhino calves. In 2000, lions killed one female rhino calf and in 2003, hyenas killed two newly born rhino calves in the Crater. Due to the predation pressure on the rhino calves from hyenas, game rangers closely monitor a newborn calf until it is big enough to defend itself from hyenas. Predation of rhino calves in other rhino populations in Tanzania has not been reported, likely due to the low density of large predators like spotted hyenas in the respective areas.

Poaching

As a result of strengthened law enforcement there have been no reports of rhino poaching in the fragmented Tanzanian populations since 1996, when poachers in Ngorongoro Crater shot one female rhino (Amiyo and Mremi, pers. comm 2003). The new rhino population that established a refuge in 2001 in the northern Serengeti National Park from the Maasai Mara National Reserve in Kenya is facing a potential threat because of its proximity to an area experiencing high poaching pressure and also because it is near the international border between Tanzania and Kenya (Frame 1980). Fortunately, conservation authorities have increased anti-poaching activities in the area. Moreover, a mutual understanding between the two protected areas from the two countries has enabled trans-boundary anti-poaching patrols, thus reducing poaching pressure in the area. This 'refugee' rhino population has attracted great support from conservation donors including FZS.

In 2005 two rhinos were reported missing from the Crater and were assumed to have been pushed out by the dominant bull, Mike I (John). Efforts have been undertaken by the Ngorongoro Conservation Area Authority (NCAA) to try to trace their whereabouts.

Challenges

The Wildlife Division, Ngorongoro Conservation Area Authority and Tanzania National Parks manage the local rhino populations in their respective areas of authority separately, with central co-ordination from the Wildlife Division and financial support from

donors. The rhino, as a flagship species, makes its conservation a political issue. It is sometimes difficult to obtain decisions when it comes to intervention like the proposed idea of relocating some bulls between the existing local populations. One of the challenges ahead is how to co-ordinate rhino conservation in the scattered populations. The successful conservation programme should bring together the human resources from both within and outside the country in order to formulate acceptable conservation strategies for all stakeholders that enhance rhino population growth with the view of extending their habitat within the different protected areas where they once nearly went extinct due to poaching. Another challenge is the execution of management strategies for the 32 rhinos that will be translocated into the Serengeti ecosystem so that the newcomers and the existing isolated small populations mix well and reproduce.

Conclusion and recommendation

Poaching, diseases, habitat degradation, fragmentation and encroachment together with an expanding human population are the major factors responsible for loss of rhinos in Tanzania. Future rhino conservation strategies need to address these factors, as they will likely continue to put pressure on the Tanzanian rhino population. For instance, with the translocation of more rhinos from South Africa to Serengeti, anti-poaching activities together with the training of local communities adjacent to protected areas should be enhanced because the rhinos will be more widespread in the Serengeti ecosystem and might range outside the Park.

While translocating some individual rhinos from one ecosystem to another would improve the genetic diversity of small free-ranging populations in the natural ecosystems such as Serengeti, screening the incoming individuals for diseases is important to avoid spillover infections. Moreover, male to female ratios must be considered carefully to avoid territorial fighting between incumbent and incoming bulls.

A national rhino conservation strategy focusing on mapping the genetic diversity of different isolated populations should be established. The study should involve experts from Tanzania universities, Ministry of Natural Resources and Tourism and foreign scientists.

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