Population size: Since 2001, the oryx population size at 'Uruq Bani Ma'arid has been estimated once a year in summer by the means of a total count, and using Chapman's modified Lincoln-Peterson Index and Seber's formula for the calculation of variance and 95% confidence interval (*see* Bedin & Ostrowski, 2003 *for site-specific details, and* Seddon *et al.*, 2003 for *methodological details*). Results have been in agreement with crude estimates based on routine monitoring, and consistency in the methodology now allows to compare estimates across years. This year's total count was carried out on 11th-15th August. Few calves and sub-adults were observed, and the entire population was estimated at 107-151 individuals (1 male: 1.2 female), nearly identical to the estimate of the adult population only (103-145 oryx) (see Figure 1). Since the first release in 1995, a total of 156 oryx have been re-introduced in the reserve, and we estimate that 56 of them are still alive and present in the protected area. After an initial phase of increase due both to continued releases and natural recruitment, the oryx population of 'Uruq Bani Ma'arid has not significantly increased or decreased between 2001 and 2003 (*see also* Bedin & Ostrowski, 2003).

However, according to this years estimate, the entire population has sensibly diminished. As regards adults only, the population has also decreased compared to 2001, but not significantly compared to 2003. Potential reasons to this decline are several, including deaths related to environmental stress and conspecific fights, an undetected emigration trend, a bias in the method due to the presence of unmarked wild-born animals in areas not surveyed, illegal hunting, or a demographic fluctuation in response to exceeded habitat capacity (*see also* Bedin & Ostrowski, 2003). Of these reasons, poor range condition and poaching appear to be predominant (Mésochina *et al.*, 2003b). Indeed, the low number of sub-adults observed in 2004 despite the birth of about 70 calves in 2003 suggests an important rate of mortality among juveniles, probably due to the absence of rainfall in 2003 and resulting poor grazing. Likewise, all ten oryx released in July 2002 perished during the last four months of 2003. Concurrently, the impact of poaching is considerable on the already fragile population of 'Uruq Bani Ma'arid, presently accounting for 23% of recorded deaths since its onset in 1998. Despite past measures taken to deter hunters (new ranger camps and increased ground patrolling), an estimated 5 – 10 % of the adult oryx population has been killed over the last 12 months. Fortunately, decisions were made by the NCWCD in September 2004 to reinforce both air and ground surveillance of the protected area.

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Twenty years of rhino re-introduction in Dudhwa National Park, Uttar Pradesh, India

The first rhino re-introductions in India took place from the Pabitora Wildlife Sanctuary, Assam and The Royal Chitwan National Park, Nepal into their former range in Dudhwa National Park (DNP) in two phases during 1984 and 1985. The last rhino in the lowland grassland area known as *terai* in Pilibhit district, close to DNP, was killed in 1878. The Indian one-horned rhinoceros (*Rhinoceros unicornis*) roamed over the Indus, Gangetic to Brahamputra flood plains of the Indian sub-continent and in the relics of Mohenjo-Daro era, some rhino seals were found which are preserved in the Indian National Museum, New Delhi. The records say that the invading Emperor Timor hunted and killed many rhinos on the frontier of Kashmir in AD 1398 and there are evidences that rhino existed in parts of the west of sub-continent as far northwest as Peshawar until the 16th century. Babur, the founder of the Mughal Empire in India in his famous memoirs, the Baburnamah, described how he hunted rhino in bush country near the Indus as late as 1519.

Out of the three species of rhino that roamed over the Indo-Gangetic and Brahamaputra floodplains, two species, the Javan rhinoceros (*Rhinoceros sondaicus*) which was once "fairly common" in the Sundarbans became extinct in India about 1900 and the Sumatran rhino (*Didermoceus sumatrensis*) disappeared from the Lushai hills of Assam in about 1935. The only species of Asiatic rhinoceros that exists in Indian subcontinent is the great Indian one-horned rhinoceros (*Rhinoceros unicornis*). The causes of disappearance of *Rhinoceros unicornis* from much off its former distribution range and population decline were primarily:

- Destruction and fragmentation of habitat primarily for agriculture.
- Sport-hunting during the Mughal period and the early days of British rule in India.
- Poaching of horns and other parts.

In Assam Col. Pollock a Military Engineer engaged in laying of roads in Brahmaputra Valley almost shot a Rhino

or a wild buffalo for breakfast every day and Maharaja Nirpendra Narayan of Coochbehar shot 208 rhino between 1871 to 1907. At the beginning of this century, even though there is no precise documentation regarding the population of rhino that existed in India at the turn of the century, it is believed that approximately 100 individuals (50 to 60 in Assam and 40-50 in West Bengal) survived at the beginning of the current century. The current world population is estimated at 2,500 animals mainly in India and Nepal. These are restricted to natural populations in Assam (Kaziranga, Manas, Orang and Pabitora), two in West Bengal (Jaldapara and Gorumara), one re-introduced population in DNP and one migratory population in Katerniaghat in Uttar Pradesh (U.P.). A few rhino also exist in Bhutan adjacent to Manas Tiger Reserve, Assam.

In Nepal, the three rhino populations are in the Royal Chitwan National Park (NP), Royal Bardia NP and Sulkhlaphanta WLS. The Rhino of Royal Chitwan N.P. comprise a natural population while the other two are re-introduced. The Kaziranga National Park in Assam has the biggest population of rhino (about 1,600 individuals) and while in Nepal the Royal Chitwan NP in Nepal has about 600 rhinos. In 1979, the Asian Rhino Specialist Group of IUCN Species Survival Commission emphasized the need for continuous efforts in protection and monitoring of the species and "to establish additional viable population in suitable areas, preferably in the former distributional range of the rhino". Thus, on the basis of this logic the IUCN Rhino Specialist Group and the Rhino sub-committee of the Indian Board of Wildlife (IBWL) recommended the establishment of additional rhino populations in India and they were re-introduced into DNP in 1984.

The 1984 Translocation from Assam

Early in 1984 a group of about ten rhinos living outside Pabitora Wild Life Sanctuary in Assam was selected by the Assam Forest Department for the capture as they were causing crop damage and proving difficult to protect. Between 11th and 21st March 1984, six animals were captured by drug immobilization, crated, revived and transported to stockades a few kilometers from the capture area and released. After release animals were encouraged to wallow and in most cases satisfactory feeding was established within two to three days. A team of veterinarians rendered necessary health care, mostly consisting of treatment of superficial lacerations received during the capture. The first animal captured, a large male, escaped from its stockade during the night. On 30th March, the five remaining animals (a sub-adult, two elderly females, a young adult and one older male) were transported to Dudhwa National Park. One female died due to stressful abortion after 11 days but the remaining four settled well; three were released from the stockades on 20th April 1984 and the large male was released on 9th May, after being fitted with radio collar. Another female died on 31st July 1984 after a bid to tranquilize her to treat a wound. Thus only three rhinos (1 female and 2 males) were left remaining.

The 1985 Translocation from Nepal

To establish a rigorous breeding nucleus of rhinos in Dudhwa, it was decided to introduce more stock from a

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different population and four adult female rhinos, from the Royal Chitwan National Park, were exchanged for 16 domesticated Indian elephants. By selecting only females, the reproductive potential in Dudhwa would be more than doubled and eventual mating of these animals with the totally unrelated Assam males would ensure maximum genetic vigor. All four female rhinos, estimated to be between five and seven years old, were immobilized and driven 720 km to Dudhwa and were released into the wild after a week.

Present Status

Of the total of nine rhinos translocated to Dudhwa Tiger Reserve, seven survived in excellent health and these consisted of the young female and both the males of the 1984 translocation from Assam, and all four young females of the 1985 translocation from Nepal. Thus, these seven rhinos constituted the seed population of rhinos at Dudhwa National Park. In 1988, one adult male from Assam died after a fight with another dominant male. Again in 1991, a female, from Nepal died due to an internal infection and abortion. She also lost her male calf in 1993 killed by the dominating male. The present rhino population comprises a total of 21 rhinos comprising of 16 calves born in this area and five rhinos from the founder population.

All the rhinos are in a 27 km^2 area encircled by an electric fence in the south Sonaripur Range. Daily, four riding elephants are used for monitoring and in the rainy season, boats are used to monitor the fence in the southern part of the Rhino Re-introduction Area (RRA). If there been a few more males capable of participating in breeding, the birth rate in the population might have been much higher and genetically healthier. As the same dominating male sires all the calves, the females of the progeny are mating with their sire - this is a very sad part of the entire program. The population as of now is heavily inbred and this trend should not be allowed to continue. An attempt to tide over this problem was made by bringing one male from Kanpur Zoo in 1992, but the resident male did not allow it to settle down and was also seriously injured and was sent back to Kanpur Zoo after treatment. Now, we are faced with a situation in which even if Dudhwa born males establish themselves, they will be mating with close relatives which is genetically undesirable.

Conclusion

The re-introduction of rhinos in DNP has resulted in the first viable population of rhino in the *terai* areas of U.P. since the last century. Following India's footsteps the Government of Nepal also has re-introduced rhinos into Royal Bardia National Park from the Royal Chitwan

National Park. Both these re-introduction programs have proven highly successful and there is every hope that it will undoubtedly lead to further use of this approach to re-populate selected areas of the rhino's former distribution range. The re-introduction areas need to be extended and provided with more corridor type outlets so that animals can freely roam within different areas. Last but not the least, as long as the myth of the aphrodisiac and medicinal value of the rhino horn persists, the animal will never be safe form poaching, which has become a lucrative business. Strong protection and mass awareness seems to be the only and best alternative to address this issue.

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Mass capture and translocation of Bohor Reedbuck from an agricultural holding to several conservation areas in Kenya

Bohor reedbucks (*Redunca redunca*) are medium sized antelopes that are found in floodplain and drainage-line grasslands of northern and southern savannah in the Ethiopian biogeographic region of Africa (Estes, 1991). Their habitats are grasslands and wide plains that have tall grass in which they can hide and are rarely found on steep slopes or tall grasslands because of poor vegetation (Newell, 1999). In Kenya Bohor reedbucks are found in small numbers in isolated pockets outside protected areas. The highest concentration of these animals, approximately 1,200 in number occurs in a large-scale agricultural farm in northwestern part of the country. To conserve this population and reduce wheat destruction, translocation to extensive wildlife conservation areas is essential.

There is paucity of literature on Bohor reedbuck capture and translocation. However, literature on capture and translocation of common reedbuck (*Redunca arundinum*) and mountain reedbuck (*Redunca fulvorufula*) is available (Dauth *et al.*, 1987 & Mckenzie, 1993). Common reeducks have been captured and translocated in South Africa and Zimbabwe with exceedingly high mortality, with a reported mortality of 100% in one instance (Mckenzie, 1993). However use of long acting tranquilizers reduced the mortality to about 39% (Flamand & Rogers, 1992). On the other hand, mountain reedbuck have been successfully captured and translocated regularly in South Africa (Dauth *et al.*, 1987 & Mckenzie, 1993). The capture and translocation was undertaken with the two main objectives in mind, 1) reducing the stocking rate in the agricultural holding thereby lessening crop destruction, 2) to restock and establish nuclear breeding herds in recipient areas.

Capture Methods

The capture site was a large-scale agricultural holding about 20 km east of Eldoret town in North-western Kenya. Wheat farming is the major agricultural activity in the farm, although maize and dairy farming is practiced on a smaller scale. The farm is fenced using an electric wire and medium sized private farm and small holder community farms surround it on all sides. In the farm are other wildlife species namely oribi (*Ourebia ourebi*), Rothschild's giraffe (*Giraffe camelopardalis*) and bush duiker (*Sylvicapra grimmia*). The Bohor reedbuck numbers approximately 1,200 according to a recent census while the other animals occur in smaller numbers. The Bohor reedbucks cause massive destruction of wheat crop amounting to several hundred thousand US dollars.

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The release sites were 4 different conservation areas in Kenya:

- The Lake Nakuru National Park is a fully fenced protected area that is a world renown bird sanctuary and is also home to a variety of wild mammalian species most notably the white and black rhino. It neighbors Nakuru, a cosmopolitan town in the heart of Rift Valley. It is about 150 km from the capture site.
- Nairobi National Park is a fenced protected area on all sides other than the southern boundary. It is found within the city of Nairobi. It is about 300 km from the capture site.
- Lewa Wildlife Conservancy is a private ranch located in Laikipia District that is fully fenced on all sides with only a window for elephant migration on the northern boundary. It is about 450 km from the capture site.
- Meru National Park is a protected area in eastern Kenya where wildlife had almost been wiped out due to poaching in the last 2 decades. It is undergoing rehabilitation after security was beefed up. It is about 600 km from the capture site. Bohor reedbuck were found in all these areas in the past but they have been decimated or their numbers have gone too low due to poaching and human encroachment on their ranges.

Bohor reedbucks were captured using nets. The nets were set in thickets near an area of high concentration for camouflage. The animals were pushed towards the net using vehicles. Once entangled they were physically restrained and a tranquilizer, haloperidol (Kyron Laboratories (Pty) Ltd, Benrose 2011, South Africa) administered immediately intravenously. The dosage was 8 mg, 6 mg, 4 mg and 2 mg for adult male, adult female, subadults and juveniles respectively. Once tranquilized the animals were placed into the transportation crate. The crate was modified to allow a short distance between the floor and the roof. This was achieved by putting a hesian cloth midway between the floor and the roof. This modification was to prevent the animals jumping a high height hence avoiding fractures and injuries to other animals. Papyrus reeds and grass was also placed in the crate in order to make it as dark as possible and also to provide dark corners where the animals could hide thereby mimicking the natural environment. Females, sub-adults and juveniles were transported together in mass