

## Management of Re-Introduced Greater One-horned Rhinoceros (*Rhinoceros unicornis*) in Dudhwa National Park & Tiger Reserve, Uttar Pradesh, India

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### Introduction

Historically the range of the Greater One-horned Indian Rhinoceros (*Rhinoceros unicornis*) once extended all along the flood plains of the river Indus, Ganges and Brahmaputra. Babur-nama has recorded the presence of rhino in Hindukush to the west to the present Indo-Mynnamar border to the east. Over hunting and habitat destruction along with a number of anthropogenic pressures in the last 300 years wiped out the rhinos from most of its range of distribution except in pockets left in north-east India in the states of Assam and West Bengal alongwith Nepal where such vestiges of terai constitute the last strong hold for rhinos. Currently, around 2,500 rhinos exist in the wild of which approximately 1500 are in Kaziranga.NP, Assam and 500 in the Royal Chitwan. NP, Nepal. The rest are found in small insecure pockets, in Assam, north Bengal and Bhutan. In addition to these wild rhino were reintroduced in Dudhwa.NP, India and Royal Bardia.NP, Nepal.

In 1979, the Asian Rhino Specialist Group of the IUCN Survival Service Commission emphasized the need for continuous efforts in protection and monitoring of the species, "to establish additional viable population units in suitable areas, preferably in the former distribution range of the rhino".

This was possible in India only due to the keen interest of the former Prime Minister of India, Smt Indira Gandhi and her full support to the rhino reintroduction program. Following up on the recommendation of the Asian Rhino Specialist Group, the Wildlife Status Evaluation Committee of the Indian Board For Wildlife appointed a sub-committee to consider alternative areas for establishing a rhino population by translocation in suitable habitats. Of the various areas considered by this sub-committee, Dudwa National Park was adjudged to be the most suitable because of the suitability of the habitat which indicated significant similarities to habitats of Kaziranga National Park. The area was a portion of the historic range of the rhino. The last one having been shot in the region during 1878. The assessment was carried out by experts of Asian Rhino Specialist Group and vegetation studies were conducted by the Botanical Survey of India that revealed the presence of several preferred food species of rhino.

The following floral elements are common to Dudhwa, Kaziranga and Manas National Parks:

Grasses	10 spp.
Herbs & Climbers	10 spp.
Hydrophytes	6 spp.
Shrubs & Under shrubs	7 spp.
Trees	12 spp.

A list of rhino food plants was made up by 14 species.

### The Rhino Re-introduction Area

Once the decision to establish a rhino population in Dudwa was taken, considerable groundwork was needed to make this a reality. The area selected as the Rhino Reintroduction Area (RRA) was in the South Sonaripur Range of the park. It comprises of the entire Kakraha Block and a part of Chota Palia Block extending to some 27 sq. km. The R.R.A. has as many as nine permanent large and small swamps. The chain of these lies along the damar sal and grassland ecotone. These lakes and two streams, Andhra and Chabakwa represent remnant flows of the old courses of the river Suheli. During monsoon, major positions of the grasslands are flooded. Water currents can be seen in the two streams and across the chain of swamps while the other areas have up to 4 feet of standing water. The area of 27 sq.km. comprising some damar sal forests (20%) and grasslands (80%) was initially enclosed by a three-strand power fence. A 9 km. stretch of the Park boundary was additionally protected against accidental escape by construction of an elephant-proof trench equally effective for rhino outside the power fence. Holding stockades were built for the new arrivals within the fenced zone. Selected field staff was sent to Assam for training in rhino management.

During March-April 1984 six rhinos were captured near Pobitara Wildlife Sanctuary in Assam. Of these one died at Guwahati Zoo and the rest, two males and three females were translocated to Dudwa having been airlifted from Guwahati to Delhi and then onwards carted by trucks. At Dudwa, the animals were kept in stockades and then released. Of the five animals, one female died of stressful abortion before she could be released. The first batch of animals was released in Dudwa on 20.4.1984. The larger of the two males was held back until the others had settled and later released after having radio collared. Another female died on July 31, 1984 after a bid to treat a wound and pinched nerve. With only one female and two males left, an urgent need was felt to translocate some more rhinos. A collaboration was negotiated with the Government of Nepal and it was agreed that in the exchange of four wild young adult female rhinos from Nepal sixteen domesticated trained elephants would be given by the Government of India to Nepal. The rhinos captured near Chitwan National Park in Nepal were carted to Dudwa in April 1985. Thus these seven rhinos, two males and five females made up the founder population of rhinos at Dudwa.

The first evidence of breeding in the reintroduced population was detected in form of remains of a newly born calf in a patch of tall grass in August 1987. There were no signs of predation, hence it may have been a case of premature birth or any such natural circumstances. The first successful calving occurred in early 1989. This was followed by three more calves in the same year.

Of the two bulls, the larger named Raju had asserted his dominance amongst the reintroduced animals. The other male named Bankey with passage of time became more and more aggressive that resulted in frequent fighting between the two. During mid 1988, in one fight Raju broke his horn and thereafter Bankey became the dominant male. Raju was chased out of the fenced area time and again. A fence was created to separate them but in October 1988 Raju was found dead. He had sustained several injuries. Bankey continues to be the dominant male even today.

Table 1 depicts the sequence of birth and death in the rhino population, which currently stands at 15 rhinos in Dudhwa NP & Tiger Reserve.

The animals within the founder population were given names and were identifiable. Naming was discontinued after growth in the population. Individual rhinos can be identified by their marker features like white pigment patch between upper and lower lips, old wound scars, tail length, behavior, shape and size of the horn, etc.

During 1991 an attempt was made to counter the anticipated problem of inbreeding by introducing a male, named Lohit, in captivity from Kanpur Zoo. He was repeatedly attacked by Bankey and severely injured. This animal had to be taken out, treated and returned to the zoo after it had recovered.

One wild female rhino had found her way into the RRA. She definitely must have belonged to the population in the Royal Bardica NP in Nepal. She died when attacked by Bankey.

The RRA has a network of roads and can be approached from outside from 3 sides, namely, Base Camp, Chota Palia and Salukapur where gates have been provided in the power fence. There are two main roads inside the fence - while one travels straight from Salukapur to Base camp, the other runs along the Southern perimeter fence joining the main road at either end. As these roads remain unserviceable for long periods during and after monsoon, an additional road from Salukapur to Kakraha was made in 1997-98. A feeder road links the central main road and the peripheral road. An inner partitioning three-stranded mini-fence was constructed in 1993-94 and an additional fence was raised inside during 1997. During 1998 the 3 strand fence was raised to a height of 2.58 m with seven strands. These are maintained by staff and labour based at Salukapur and Base camp. The fence is powered by two energisers based at these places. At Salukapur the staff is housed in conventional quarters. At Base log huts have been built on top of high piles for housing the staff. This is a special requirement as the area remains under water for prolonged periods during monsoon. The departmental elephants required for monitoring are based at both places. Initially only rhinos were monitored daily and the record was maintained in a register. However in recent years sightings of tiger, Bengal Florican, swamp deer are also recorded.

## Births and Mortalities in RRA (1984 – 2001)

### A. Calf Mortality

During the last 17 years of reintroduction of program 22 births took place. All the calves born in RRA belong to the five female rhinos of the founder population and three females born in RRA. Between 1987 and 2001, 12 calf mortalities were recorded that includes six cases of abortion. In current rhino population of 15 rhinos include 10 within the age group

Released (Origin / Age)	Died	Re-turned	Surviving	Born	Aborted	Died	Surviving	Died	Aborted	Surviving				
1	2	3	4	5	6	7	8	2+7=	6	4+8=				
old stock				bred in Dudwa				total population						
<b>MALES</b>														
3 Banke (Assam/7) (31.03.84)	1 Raju (11.12.88)	1 Lohit	1 Banke	6 R-1 (19.05.89) N-3 (31.07.92) S-1 (12.10.89) S-2 (10.08.91) N-1-1 (11.01.94) P-3 (28.04.92)	-	3 R-1 (11.12.93) N-1-1 (17.01.94) S-1 (07.01.90)	3 N-3 S-2 P-3	4 Raju (11.12.88) R-1 (11.12.93) N-1-1 (17.01.94) S-1 (07.01.90)	-	4 Banke N-3 S-2 P-3				
<b>FEMALES</b>														
7 Saheli (Assam/30) (31.03.84)	3 Saheli (12.04.84) Aasha (31.07.84) Rapti (25.09.91)	-	4 Pavitri Swayam Narayani Himrani	7 P-1 (04.08.91) P-2 (21.09.95) N-2 (01.06.89) H-1 (02.02.89) H-2 (05.08.92) H-1-2 (02.10.99) S-3 (07.10.94)	1 H-1-1 (95)	2 P-2 (21.01.96) H-1-2 (28.10.99)	4 N-2 H-1 H-2 S-3	5 Saheli (12.04.84) Aasha (31.07.84) Rapti (25.09.91) H-1-2 (28.10.99) P-2 (21.01.96) P-1 (12.01.00)	1 H-1-1 (95)	8 Pavitri Swayam Narayani Himrani S3				
Sex unknown				4 S-4 (06.08.98) H-3 (19.10.97) H-2-1 (12.06.99)	3 Sa-1 (84) N-1 (87) R-2 (91) N-1-2 (17.09.97)	2 N-4 (10.01.00) H-2-1 (25.02.00)	3 S-4 H-3 N-1-2	2 N-4 (10.01.00) H-2-1 (25.02.00)	3 Sa-1 (84) N-1 (87) R-2 (91)	3 S-4 H-3 N-1-2				
<b>Sum</b>				10	4	1	5	17	4	5	10	9	4	15

Table.I. Sequence of birth and death in the rhino population, which currently stands at 15 rhinos in Dudhwa.NP & Tiger Reserve. Abbreviations: P- Pavitri, Sa- Saheli, S- Swayamvara, H- Himrani, N- Narayania, R- Rapti, H-1- first progeny of Himrani, H-1-1- first calf of the first progeny of Himrani.

of 3 to 12 all born in RRA. The sex ratio is 3 males to 7 females. These calves are sired by single dominant male.

### B. Adult Mortality

Between 1984 to 1994, five adult rhinos comprising of one male and four females died due various reasons in the years 1984, 85, 88, 91 and 1993. This includes the female from Bardia. NP, Nepal who had found her way inside the RRA.

### Age of mother at first population

Regular records are kept on individual rhinos from the day of translocation. It is observed that under the age of 7 years fetuses were aborted. Six such cases of abortion are reported. In 2 cases abortion took place under conditions of severe physical stress due to injuries sustained by one female while being transported and the other was repeatedly attacked by the male.

### Main Causes of Mortalities in RRA

#### Calf Mortality (12 Cases)

- a. Pre- mature birth / abortion – six cases
- b. Tiger predation on calf – one case
- c. Lung congestion and infection- 2 cases
- d. Killed by dominating male- 1 case
- e. Internal infection / enteritis- 2 case

#### Adult Mortality (5 cases)

- a. A male died of Hemorrhagic Septicemia (HS) - 1 case
- b. Injury due to accident and paralysis - 1 case
- c. Injured by male, and consequent abortion – 1 case
- d. Attacked by male. Several injuries - 1 case
- e. Stressful abortion and infection – 1 case

### The Rhino Reintroduction Area:

There are four watchtowers inside the RRA. While three are located around Kakraha swamp, one is at Kaimaiab. All are wooden structures. These serve as animal observation posts and fire watchtowers.

To supplement and sustain the swamps during summer seven tubewells have been bored. These are one each at Aamha, Chaitua, Bela, Puraina and Kurmunia swamps and two at Kakraha swamp.

Salukapur staff station is linked on wireless network of the Reserve through a fixed station. There is a hand held set at the Base Camp.

### Problems

#### 1. Population Size

The small population of reintroduced rhinos attracts all well documented threats generally applicable to small populations in the wild. Random natural events have the potential of severely limiting their future survival. Currently the breeding population comprises of only one male and six females. A young adult male is present but is unable to assert itself. The present dominant male has driven it out of the fenced area on several occasions. In fact in 1997 an additional area of 5 sq.km. in Bhadraula Block 2a, 2b, 3a, and 3b had to be fenced to provide a safe haven for this animal. The two males were often seen parading on their respective sides of the common section of the fence.

#### 2. Maintenance of Power Fence

The original 1.5 m high 3 strand power fence was in 1988 raised to the height of 5.8 m with 7 strands alternately energised by two energisers that shared the total fence perimeter. The alteration in the fence was carried out to prevent entry of tigers having overlapping home ranges within the RRA to preclude predation threat to rhino calves. The fence was closed after ascertaining that no tigers were present within RRA. However fence is successfully negotiated by tigers.

An internal partitioning three stranded fence called the mini-fence was setup in 1993-94 bisecting the area. It is used for controlling the movement of rhinos, especially in the event of fights.

The main problem is to maintain the fence in optimum working condition at all times round the year. The two energisers are operated on heavy-duty 12-volt batteries. These have to be recharged and replaced periodically a task that is made difficult by remoteness. It is especially problematic in monsoon when the area is flooded. While rhinos generally respect the fence, power or not, wild elephants periodically visiting the park often break through when batteries are not working. The wooden fence posts decay quickly in the moist conditions and have to be replaced regularly. Rusted broken wires have to be changed and insulators replaced. The entire length of the fence has to be checked daily to ensure that no branch or tufts of grass or other vegetation touches the energised stands such events cause earthing and make the fence ineffective. These operations are made difficult by the remoteness of the area, and logistics. Condition get aggravated during the monsoon when large portions of the RRA is under water.

#### 3. Poaching

Currently the strong managerial inputs have ensured the desired security. However the possibilities are always there because of the proximity of international boundary and determined poachers. From time to time poisoning of tiger mainly outside the reserve, snaring of other animals both inside the park and outside is detected.

#### 4. Park Interface Problem

Villages are located near the southern fringe of the power fence. The villagers at times venture into the RRA for collection of thatch grass, fodder and at times fuel wood and illegal fishery in the swamps. The addition of the southern buffer has helped in reducing the problem to some extent. It has been observed that in the past the theft of fence wire was directed at preparing snares by local poachers to snare deer found in rhino reintroduction area (RRA). The material is now replaced by the infinitely superior scooter/motorcycle clutch/break cables to prepare such snares. Because of this daily monitoring of entire length of fence and monitoring rhinos with the help of riding elephants has contained the problem to a minor level.

#### Strategy

##### 1. Augmenting genetic variability:

The original target was aimed at releasing 30 rhinos. The precise reason why this was not carried further after release of two batches is both financial and administrative. However, due to breeding the number has increased from seven to fifteen. The Dudhwa Rhino population should not be allowed to stagnate. The problems of inbreeding as well as desired response to stochastic events need to be addressed. These are rooted in genetic variability as well as in numbers. These need to be overcome with further restocking from the wild with individuals preferably captured from 'large' populations. The original number of 30 though not a magic number needs to be considered. These could be from Nepal or Assam and all need to be from the wild. That are not 'nuisance' animals habituated to crop raiding. There is an excellent example across the border in Nepal. The Royal Bardia NP has now a population 70 rhino, all reintroduced. Although this area is facing poaching problems for rhino horns.

To prevent inter specific aggression amongst males it is necessary to enhance the fenced area with in consideration to swamps, wallowing grounds, grasslands and upland forest habitats. The fenced area could be extended to include Gupti Phanta area including road no. 60 leading towards Belraiyan.

Waterholes and additional wallows can be created in the southern portions of Kakraha & Aamha phantas (grasslands) to cause more extensive utilisation of the habitat and also help to reduce intraspecific competition.

#### 2 Habitat Management

##### (i) Grassland Management:

Grassland habitat has to be managed in consideration of endangered species, prey species of the tiger, and sensitivity to breeding requirements of species that are obligate of the grasslands. Rhinos within their grassland thrive on mosaics of succession. As an example on the areas utilized by Bengal Florican, grass is cut first prior of burning in patches in a mosaic manner while the areas used by hispid hare are protected from fire. Controlled and cool burning plays an important role in management of grasslands especially relating to timing and pattern of prescribed burning.

##### (ii) Water Management:

This is being done by using tube wells to supplement water to six swamps (taals) during

summer. Adequate number of pumping sets is available for this area. The creation of additional wallows and water holes will require three new borings.

##### (iii) Power Fence:

The power fence has 1000 posts in the main fence, 600 posts in the mini-fence and 200 posts in the additional fence. The service life of a fence post is about three years after which they need to be replaced. Thus about 600 fence posts need to be replaced each year the additional areas will require fence posts as follows:

The existing two energizers need to be supplemented by atleast two more. The additional fence will require four more energisers, two for each area. Extension of the fenced area will also require adequate manpower for daily maintenance and patrolling. The existing battery operated system needs to be complemented by solar panels. This will help in reducing the stressful task of recharging batteries from mains. The solar arrays have to be expanded to make the system more efficient. Initial investment will be more expensive. Attendance to problems that are not frequent will need extra effort.

The most vulnerable power fence stands are the lowest two which get submerged during monsoon especially the one that is lowest are badly rusted and need to be replaced. About 60 km. needs to be replaced at once. This is proposed to be done during the first two years of the plan period. The rest will be replaced in next three years.

##### (iv)

Establish another RRA enclosing Bhadhi tal area by translocation of rhinos other from the RRA especially the young male and female group or those that might be planned under recommended negotiation.

#### Monitoring

The rhino population at present is monitored daily from elephant back. Presently four elephants are engaged in this work. The mahawats and staff scan the area for rhinos establish identities/activity and report their observations which are recorded in a register maintained for the purpose. Daily reports are sent to Range Head Quarters and office of the Deputy Director at Palia. Not all rhinos may be sighted on a given day. The numbers and identities vary from day to day. But across the observations an overarching evaluation is enabled. To make the monitoring more effective the following is recommended:

- (i) Increase in number of elephants from 4 to 6. Thus two new elephants need to be developed.
- (ii) Review the past data reorder the procedure as necessary.
- (iii) Keep track on significant so that treatment could be undertaken.

The entire area of original RRA be divided into 4 portions. Each to be monitored with the help of an elephant and the additional areas to be monitored by the two extra elephants recommended.

Besides rhino, this area has a number of endangered species like tiger, leopard, elephant, Bengal Florican, Swamp Partridge, Hispid hare, swamp deer, the rare hog deer, prey species like chital, sambar, barking deer, the endangered python and over 400 species of resident and migratory avi-fauna, including the endangered *Accipiteridae*. Nesting eagles,

vultures, seasonally appearing Bengal Florican, tiger. Data on direct sighting and pugmarks of tiger, group size, sex and age class of ungulates, python numbers and sites; elephant numbers, age and sex classwise are also monitored.

### Communication

- (i) Each mahout guard and forester on monitoring duty be provided with walkie talkie sets so that they are always in contact while conducting monitoring.
- (ii) A road will be built along the inner side of the entire fence to facilitate patrolling & fire management. This will be continuation of the road along the southern perimeters.

### Eco development and buffer management

- (i) All the villages along the southern fringe of the RRA to be included in Eco-development programme.
- (ii) The buffer areas of Gulra block to be managed intensively to ensure that people do not venture into the RRA.

## Conservation Programs for Sumatran and Javan Rhino in Indonesia and Malaysia

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### Abstract

There is an intensive and international program in progress to try to conserve the two most endangered Rhino species: the Sumatran Rhino and the Javan Rhino, both occurring in Southeast Asia. The effort is employing a diversified and integrated strategy that is attempting (1) to protect the species in the wild using anti-poaching teams known as Rhino Protection Units (RPU) and (2) to breed the species under managed conditions in breeding centers in native habitat.

### Background

Of the five extant Rhino species, the Sumatran (*Dicerorhinus sumatrensis*) and Javan (*Rhinoceros sondaicus*) rhino of South East Asia are the most endangered and acutely threatened with extinction. The third Asian species, the Indian Rhino (*Rhinoceros unicornis*) is more secure in India and Nepal, where it has recovered through good conservation and protection to viable levels. Nevertheless the three Asian rhino species together number fewer than the rarest of the African Rhinos, the Black Rhino (*Diceros bicornis*), while the most numerous African species, the White Rhino (*Ceratotherium simum*) is three times more numerous than all other species combined (See Table 1 below).

As recently as the early 20<sup>th</sup> century, both the Sumatran and Javan species were widespread over South Eastern Asia from eastern India through Indochina, the Malay Peninsula and selectively on Sumatra (the Sumatran and the Javan), Java (the Javan), and Borneo (the Sumatran, and Javan until about 12,000 years ago).

Today, the only confirmed, significant populations of Sumatran rhino survive in three geographically distinct areas of two range states: in Indonesia on Sumatra; in Malaysia, on the Peninsula; and in the Malaysian State of Sabah on the island of Borneo. Recent evidence suggests that some Sumatran rhino still exist in Thailand along the border with Malaysia, in northern Myanmar, and perhaps in India on the border with Myanmar, but the significance and validity of these reports has yet to be confirmed (See Map 1).

About 300 Sumatran rhino are estimated to survive worldwide. Although not as rare as the Javan rhino, poaching pressure is more intense on the Sumatran rhino, whose populations have declined considerably in the last decades, almost entirely due to poachers. The remaining populations are fragmented and small, with not a single area that has more than about 50-75 animals. Thus, the Sumatran Rhino is considered the most critically endangered species of rhino by the IUCN/SSC Asian Rhino Specialist Group (AsRSG).

The Javan Rhino is confirmed in only two populations: about 50-60 in Ujung Kulon National Park on the western tip of Javan in Indonesia and another 5-8 in the Cat Loc area

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## **A Research Update on Elephants and Rhinos**

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