

Reintroduction of Greater One-horned Rhinoceros (*Rhinoceros unicornis*) in the Royal Bardia NP and Royal Suklaphanta WR, Western Lowland, Nepal

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Abstract

In Nepal, the greater one horned rhinoceros *Rhinoceros unicornis* once ranged throughout a narrow belt of southern lowland and nearby foothills. Mainly due to poaching and encroachment of their habitats for agricultural expansion, these animals became isolated in Chitwan valley, where ca 1000 animals were recorded until 1950. Rules imposed by Rana rulers against hunting and malaria safeguarded wildlife resources until the fall of Rana rulers and eradication of malaria in mid 1950s. Fall of Rana regime in 1950 and eradication of malaria during mid 1950s opened up the valley for settlers swarming from mid hills. This resulted massive destruction of wildlife habitats and wildlife populations mainly rhinoceros was seriously affected due to excessive hunting. The rhino population of about 1000 animals before 1950 rapidly decreased to less 100 individuals during 1960s. Realizing the rapid decline in rhino population in the valley the His Majesty's Government of Nepal (HMGN) declared remaining prime rhino habitats of about 544 sq km as National Park in 1979. The area was later extended to 932 sq km. After the declaration of NP and better protection the rhinoceros population in Chitwan gradually increased to reach a total population of 544 in 2000.

Mainly, to safeguard isolated rhino population from poaching and natural calamities in Chitwan and to establish a new viable breeding populations in other areas, a total of 25 rhinoceros were captured from Royal Chitwan NP to Royal Bardia NP (21) and Royal Suklaphanta WR (4) between February 2000 and March 2001. The animals were tranquilized by using etorphine hydrochloride (1.5 mg – 3.5 mg) mixed with Acepromazine (7mg - 15 mg) and loaded into wooden crate to transport by full-bodied trucks. Diphenorphine, commercially known as M₅₀₋₅₀ (4.5 mg to 9 mg) was used as antidote. To avoid excessive heat, all animals were captured before noon and transported to released site during night. Animals in Bardia were safely released in the Mulghat area, the northern proximity of Babai valley of Royal Bardia NP and in Rani Tal area of Suklaphanta.

Background

The greater one-horned rhinoceros *Rhinoceros unicornis* were once copious throughout the alluvial floodplains of Ganga, Brahmaputra and Sindh rivers and their large tributaries between Indo-Burmese border in the east and Pakistan in the west. Habitat destruction and illegal hunting has led these animals to stand on verge of extinction. At present, rhinoceros

are restricted in isolated pockets of protected areas mainly in India and Nepal. Kaziranga NP, India holds the largest (ca 1500 individuals) population of rhinoceros. A remarkably low number of rhinoceros recorded in Indo-Pak border until late 1980s are reported to have disappeared. Similarly, long-term survival of a small population of rhinoceros roaming along Indo-Bhutan border is questionable despite a vigorous effort made to protect these animals.

In Nepal, rhinoceros were reported ranging throughout the southern lowland and nearby foothills. Mainly due to poaching and encroachment of their habitats for agricultural expansion, these animals became isolated in Chitwan valley, where ca 1000 animals were recorded until the fall of the then ruling Rana regime in early 1950s. The valley was well protected by Rana rulers for their hunting purposes and prevalent of malaria in the valley served as barrier against easy movement of hill people. Rules imposed by Rana rulers against hunting of wild animals and malaria safeguarded wildlife resources until the fall of Rana rulers and eradication of malaria in mid 1950s.

Fall of Rana regime in 1950 and eradication of malaria during mid 1950s opened up the valley for settlers swarming from mid hills. As early as in late 1950s prime wildlife habitats were cleared for cultivation and wildlife populations were impoverished due to excessive hunting. The rhino and tiger populations nearly disappeared from the valley. The rhino population of about 1000 animals before 1950 rapidly decreased to less 100 individuals during 1960s.

Realizing the rapid decline in rhino population in the valley the His Majesty's Government of Nepal (HMGN) declared remaining prime rhino habitats of about 544 km² along Rapti, Narayani and Rew rivers as Royal Chitwan National Park in 1973. A new department, the Department of National Parks and Wildlife Conservation (DNPWC) was created and instrumented with overall responsibilities of day-to-day management. Later in 1975, the Royal Nepalese Army was seconded to assist DNPWC's effort to halt poaching. Since then the isolated rhino population in Chitwan increased insiduously from 60-80 animals in late 1960s to 270-310 in 1975 (Laurie 1978), 358 in 1988 (Dinerstein and Price 1991), 466 in 1994 (Yonzon 1994) and 544 in 2000 (Jnawali and Pradhan 2000).

Mainly to avoid the risk of potential threats to rhino population from poaching and natural calamities, HMGN initiated to establish a new rhino population in Royal Bardia National Park (RBNP) having similar environ. In 1986, a total of 13 animals (5 males and 8 females) were captured from Sauraha area of RCNP and successfully released in the alluvial floodplain of the Karnali River. Similarly, in 1991 another batch of 25 animals (8 males and 17 females) were captured from the same area and released into RBNP's Babai valley. Later in 1999, four males (two semi-tamed orphan sub adults and two wild adults straying in the jungle of Saptari district) were translocated and released in the same area.

In the year 2000, a total of 20 animals were capture from Chitwan and released in RBNP's Babai Valley (16 animals) and Royal Suklaphanta Wildlife Reserve (RSWR), both located in the western lowland. Similarly in the year 2001, march five more rhinos were translocated from RCNP to RBNP. Overall translocation was carried out in collaboration with King Mahendra Trust for Nature Conservation and WWF Nepal Program. A Nepalese team consisting of wildlife biologists, park officers, park rangers, game-scouts and wildlife technicians were engaged through out the capture. The present report highlights the translocation of 20 rhinoceros from RCNP to RBNP and RSWR carried out during the dry seasons of 2000 and 2001

Objective

The main objectives of rhino translocation were to establish a new viable breeding population and safeguard this endangered species from poaching and natural calamities, such as flood fire and epidemic diseases. Besides, the increase in rhino number in Chitwan contrived conflict between local people and conservation of rhinoceros, as a number of animals enter the cultivated fields during night and raid agricultural crops and harass local people (Jnawali 1989, Sharma 1991). Therefore, the other purpose of rhino translocation was to minimize the conflict perceived as one of the potential threat in ensuring long-term survival of rhinoceros.

Method and Materials

Team mobilization

A national level coordination committee representing DNPW, KTNC, Department of Forest (DoF) and WWF Nepal Program was formed to oversee over all translocation of rhinoceros. In the field level, a task force consisting of ecologists, wildlife biologists, park officers and veterinarians from DNPWC, RCNP, RBNP, KMTNC's Nepal Conservation Research and Training Center (NCRTC), Chitwan and Bardia based Bardia Conservation Program (BCP) was formed to carryout over all ground work, i.e., selection of desired animal, capture, transportation and release.

For smooth operation of groundwork, three different teams - technical, operation and logistic - were formed to smoothly execute the ground exercise. The Technical Team consisting of biologists, technicians and veterinarians was responsible for capturing and transportation. The Operation Team consisted of personnel having long experience in translocation and other supported staff including labors. The main responsibility of the Operation Team was sledging and crating tranquilized animal and then loading crated animal into the truck. Logistic Team was responsible for arranging logistics, mainly camp supply.

Use of Elephants and Elephant Staff

A total of 22 well-trained domestic elephants (17 from RCNP and 4 from NCRTC) and staff were mobilized throughout the capture operation in Chitwan. Similarly, 10 elephants were mobilized at the release site in RBNP (4) and Royal Suklaphanta WR (6) mainly to pursue released rhinoceros towards potential rhino habitats. A total of three personnel with different responsibilities are assigned to look after each elephant - Phanit serves as driver, Pachhuwa assists both Phanit and Mahut and Mahut basically serves as caretaker (cleaning stable, collecting fodder and grazing the elephant). Subba, chief of the elephant section was put in-charge to mobilize elephants assigned for capture.

Immobilizing Drug

Etorphine Hydrochloride, an opium derivative, commercially known as M₉₉, mixed with Acepromazine was used to tranquilize rhinoceros. The quantity of Etorphine Hydrochloride used to tranquilize individual animal ranged from 1.5 mg for large calf (ca 5 years) to 2.5-3mg for adults. Similarly, amount of Acepromazine mixed with M99 ranged from 0.7-1.5ml (7 to 15 mg). Diphenorphone, commercially known as M₅₀₋₅₀ was administered (4.5

mg to 9 mg) intravenously to reverse the effect of Etorphine Hydrochloride. Since Etorphine Hydrochloride is lethal to humans, a serious precaution is imperative while handling the drug. One is strongly advised to use plastic globes and cotton mask to avoid risk.

Darting Equipment and Accessories

Equipment used to tranquilize the animals included a Palmur cap-chur gun manufactured by Palmur Chemical and Equipment Co. Inc., Douglasville-Georgia, USA, an applicator, medium (yellow type) and high (red type) range cartridges, cap-chur charge, rubber plunger, metal darts (3-5 cc) and thermometer. Other materials used while handling the animals were clean white cloth to cover the eyes, clean cotton to plug the ear, clean water to wash wounds caused by dart and to cool animal body, maggoticide ointments and antibiotics.

Equipment and Other Materials for Loading and Transportation

Equipment and other materials used for loading and transporting the immobilized animals are given:

1. Loader/digger
2. A full body trucks to transport animal from loading site to release site. A total of 4 trucks were mobilized throughout translocation.
3. Tractor to transport labor and equipment.
4. Three 4wh drive pickups.
5. Wooden crate (3.50 m L X 1.85 m B X 2.65 m H) made of sal (*Shorea robusta*) wood was locally constructed to transport the animals.
6. Wooden sledge (3.20 m L X 1.30 m B X 0.25 m H) made of sal wood with ca. 6" thick straw bed.
7. About 20mm thick iron rods are used to load crates into the trucks.
8. 10m long thick cotton rope to tie up the tranquilized rhino to avoid fall-off while transporting from capture site to loading site.
9. 25-30 m long metal twins (50 mm, 40 mm and 30 mm in thick ness) mainly used to pull the sledge.
10. Plastic jerkin to carry water
11. Spades to dig the ground while setting the sledge along tranquilized animal

Capture dates and sites

The first batch of animals was captured between 27 February and 3 March 2000 from the community as well as nearby park forests of Sauraha area, Chitwan and released into the Babai valley. Similarly, the second batch of 10 animals captured between 19 and 24 November 2000 from the floodplain of the Rew River and nearby sal (*Shorea robusta*) forest of Sukibhar area were released in the Babai valley (6 animals) of RBNP and RSWR (4 animals). The release site at Babai, Bardia was located near Mulghat of Chepang, northeastern border of RBNP area where as in Suklaphanta animals were released at ca 1 km north from Rani lake. Like wise third batch of 5 rhinoceros (3 female and 2 male) was captured in the Icharni and Kumroj Community Forest on 27 th March to 29 th March 2001 and released in Babai Valley of Royal Bardia National Park.

Mode of Capture Operation

Every darting operation began early morning, (0600 - 0700 hrs) with mixing up and loading the drug, collection of necessary equipment and other materials and a short briefing on responsibilities of different teams. Briefing session was followed by a short discussion among technical team members about potential sites for searching a target animal. All elephants carrying equipment and personnel were then asked to move towards the capture site.

After reaching the pre-determined area, all elephants were gathered and Phanits were briefed about the mode rhino search. The elephants were then lined up in a U shaped manner at one end of the forest or grassland patch and moved gradually. The distance between two elephants was between 30-50 m depending on the condition of forest or grassland. Motorola transceivers were used to maintain communication among technical, operation and logistic teams.

Once a rhino with desired age and sex was located, all elephants were signaled to push the animal into a suitable site (bushy, accessible and away from the water source) and encircle tightly before actual darting was made. Before darting the animal one should make sure that the distance between the darting site and loading site does not exceed a maximum of 5 km. All animals were darted from the elephant back or from the branch of a tree. Time from actual darting and full sedation ranged from 5 minutes to 15 minutes. In one occasion, a darted male rhino escaped from the elephant circle and located after 1 hour. Since the animal was not fully tranquilized, the animal was re-darted with an additional dose of 0.5 mg of Etorphine Hydrochloride mixed with 0.25 mg of Acepromazine.

The tranquilized animal is hit with thick sticks from the elephant back to find out whether the animal is fully sedated. The Technical Team then approach fully sedated animal, cover the eyes to protect from sun light and dust, plug ears with cotton, pull out the dart and wash wound with clean water and take all physical measurements (Table 2). At the end, ca 25-30 ml of Duclocillin, an antibiotic drug was injected intramuscularly. All four animal released to Suklaphanta were fitted with radio telemetry of 164 MHz.

The Operation Team, then, takes all responsibilities of transferring tranquilized animal from capture site to loading site, make necessary arrangement to crate animal and then to load the crated rhino into the truck. Transfer of animal from ground to sledge is made in such a way that the animal lay down in lateral position. The sledged animal is tied with cotton rope to avoid fall off during the transportation. The sledge is then hooked on metal twin and pulled with the help of a loader to the loading site. The sledge is then pushed into the crate.

Before injecting M_{50-50} , the reversal one should make sure that the door of the crate toward animal's rump side is fully closed and the door on the head side is half closed. This allows veterinarians to administer the reversal drug safely. Besides, the rope tied around animal body, eye cloth and earplugs should also be removed before injecting M_{50-50} . The reversal drug is administered intravenously through ear. Since the time of recovery is very short (max. of 2-3 minutes), the front door should carefully be dropped immediately after M_{50-50} is injected and all knots and bolts should be tied tightly. The animal is left undisturbed for full recovery for about 5 minutes. The crated rhino is finally pushed into the truck parked on the ramp with the help of a loader blade.

A maximum of 4 rhinoceros was captured in a single day. The time taken from darting to loading the crated rhino into the truck ranged from a minimum of 45 minutes to a maximum of 2 hours.

Table 1. Age, sex, date of capture and physical measurements of 25 different rhinoceros captured in the floodplains of Rapti and Rew rivers of RCNP during February, March and November 2000 and March 2001.

Age class	Date of capture	Total length m	Tail length cm	Skull length cm	Skull circum m	Incisor Right Left cm	Horn length cm	Horn circum cm	Neck girth m	Shoulderht. m	Length front-rear cross fold m
February/March translocation 2000											
Adult male	27 Feb	4.20	60	75	1.48	1.5 1.1	16	46	1.40	1.9	1.20
Sub-adult male	27 Feb	3.80	65	69	1.39	3.8 3.8	21	45	1.30	1.8	0.96
Sub-ad. female	28 Feb	4.00	65	70	1.40	4.1 5.0	16	45	1.25	1.7	1.0
Sub-ad. female	28 Feb	3.45	55	70	1.27	1.3 1.2	10	33	1.15	1.6	0.90
Adult female	29 Feb	4.20	72	85	1.60	5.9 5.9	18	42	1.34	1.8	0.96
Sub-adult male	29 Feb	3.90	67	80	1.50	1.35 1.1	17	42	1.13	1.7	1.30
Adult female	1 Mar	4.80	64	86	1.60	4.3 4.3	28	45	1.68	1.9	1.10
Sub-ad. female	1 Mar	3.47	24	64	1.39	1.9 1.9	8	27	1.23	1.3	0.97
Adult male	2 Mar	3.80	67	70	1.74	5.0 5.0	31	54	1.68	1.4	1.80
Adult female	3 Mar	4.15	68	71	1.65	3.7 2.9	35	49	1.75	1.2	1.15

Age class	Date of capture	Total length m	Tail length cm	Skull length cm	Skull circum m	Incisor Right Left cm	Horn length cm	Horn circum cm	Neck girth m	Shoulderht. m	Length front-rear cross fold m	
November Translocation 2000												
Adult male	19 Nov	3.64	29	80	1.87	6.5 6.0	24	57	1.68	1.8	1.10	
Adult male*	20 Nov	4.32	70	80	1.60	7.3 8.0	33	58	1.51	1.9	1.12	
Adult female*	20 Nov	4.10	71	76	1.33	3.5 3.5	10	47	1.26	1.8	1.00	
Adult female	21 Nov	4.25	70	71	1.53	3.9 3.7	18	47	1.50	1.9	1.05	
Adult male	21 Nov	4.16	66	75	1.61	7.2 6.7	23	53	1.60	1.9	1.07	
Adult female*	24 Nov	4.15	69	73	1.63	3.9 3.0	21	49	1.37	1.9	1.05	
Female big calf	24 Nov	3.09	50	70	1.09	1.7 1.7	4	40	1.05	1.4	0.80	
Adult female*	24 Nov	4.23	70	83	1.55	2.5 3.8	17	44	1.30	1.9	1.10	
Female big calf	24 Nov	3.48	50	65	1.30	1.1 1.1	5	40	1.23	1.7	0.95	
Adult male	26 Nov	4.80	62	80	1.60	8.7 8.8	29	59	1.63	1.8	1.10	
March translocation 2001												
Adult female	27 Mar	4.16	70	85	1.50	4.45 4.4	19	53	1.30	-	1.17	
Sub-adult male	27 Mar	3.45	60	65	1.40	0.9 1.1	15	50	1.15	1.6	0.85	
Adult male	28 Mar	4.22	75	81	1.93	8.55 8.3	29	55	1.86	2.00	1.08	
Adult female	28 Mar	4.00	67	72	1.55	5.6 5.6	20	50	1.39	1.76	1.00	
Adult female	29 Mar	4.15	70	78	1.75	5.93 5.5	22	49	1.55	1.70	1.03	

* Animals released in the Royal Suklaphanta Wildlife Reserve

In most instances, trucks with crated rhinos were moved at around 1500 hrs and reached to the release site in Bardia and Suklaphanta in the next morning at around 0600 hrs and 1100 hrs, respectively. The speed of the trucks was maintained at a maximum of 40-50 km/hours. A team of biologist, veterinarian, technicians, carpenters and labors accompanied the trucks.

All translocated rhinoceros were released near the potential rhino habitats consisting of a mosaic of riverine forest and tall grassland, the most favored vegetation types by rhinoceros. Besides, both release sites contained adequate water resources.

Detail of Translocated Animals

Of the total animals, 21 were released in the Babai valley and remaining 4 (1 male and 3 female) were released in the RSWR. Age, sex, date of capture and physical measurement of individual animal is depicted in Table 1.

Conclusion

The greater one horned rhinoceros is one of the critically endangered megaherbivore found in the Indian sub-continent. Habitat destruction and fragmentation and poaching threaten the long-term survival of this species. Natural calamities, mainly flood and fire and epidemic diseases are perceived as other potential threats to ensure the very survival of rhinoceros in Nepal. In addition, isolated populations, in long run may suffer genetic erosion due to inbreeding. Establishing a new viable breeding population in other similar environment is regarded as the most practical solution in safeguarding endangered species like rhinoceros.

Realizing this, His Majesty Government of Nepal initiated establishing of new rhino populations in other lowland protected areas. A landmark initiative taken in this regard was the establishment of a founder population of 13 rhinoceros in Bardia's Karnali floodplain during 1986. So far, a total of 63 animals (including 16 animals released in 2000) of different age and sex have been re-introduced in RBNP. Similarly, 4 adult rhinos (3 males and 1 male) recently re-introduced in RSWR where one male rhino said to be escaped from nearby Dhuduwa NP, India has been roaming since last 3 years.

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