By Hemanta Raj Mishra and Eric Dinerstein

New ZIP Codes for resident rhinos in Nepal

Having staged a comeback in Chitawan, some of these still-endangered animals are being moved to stock another reserve farther west

A midnight truck caravan rumbled cautiously along the winding roadway of southern Nepal. The high beam of the December full moon flooded the route through the outer Himalayan foothills, exposing our convoy of three timber lorries and two pickups. We climbed in and out of steep ravines, alert for the presence of bandits rumored to lurk in these mountains. Fortunately, the road was deserted at this hour; only a highway patrol of jackals stopped and noted our passing. Behind us, boxed in a wooden crate, like a sideshow exhibit en route to the next carnival site, grunted a giant rhino, one of the three captured earlier in the day. Bewildered but drowsy, the behemoth probably wondered what narcotic-laden plant it had eaten to conjure up such a nightmare.

This was no hallucination, but the result of a carefully planned field operation: to restock Nepal's Bardia Wildlife Reserve in the western lowlands with rhinos captured from Royal Chitawan National Park, 220 dusty miles to the east (SMITHSONIAN, February 1975, August 1978). Rhinos have staged a comeback in Nepal, increasing steadily over the past 12 years; there were about 250 to 270 animals in 1975 and 350 to 370 in 1986. The control of poaching and cattle grazing inside Chitawan spurred the recent increase and

With jungle mynahs on its back, a greater one-horned rhinoceros munches through tall grass at Chitawan.

fueled optimism for the future of rhinos in Nepal. Nevertheless, leading conservationists recognized that their status would remain threatened until a second population of rhinos could be established in one of Nepal's other lowland reserves (an upswing in poaching or an epidemic could doom Chitawan's rhinos). With the benefits of modern technology—dart guns, immobilizing drugs and trucks—we hoped to put rhinos back where Man, in his ignorance, had run them out.

Our effort to restock Bardia with rhinos meant that we would be forced to subject these magnificent creatures to a long night of discomfort. Having studied them for the past three years and come to know individuals as friends, we sympathized with the ordeal that lay before these one-horned colonists. Sometimes, playing the role of modern-day Noah forces biologists to decide between temporary inconvenience for a few individuals and the welfare of the species as a whole.

Periodically, we stopped to check the crates. We told villagers nosing about the trucks that we were hauling spoiled produce to a fertilizer plant. In truth, the value of our payload could not have been overestimated. The entire population of greater one-horned rhinoceros (*Rhinoceros unicornis*), the second largest of the five species of rhinos, has been reduced to no more than 1,200 to 1,500 individuals overall. As such we were chaperoning almost a quorum of the world's such beasts in our timber trucks. The clandestine nature of our journey imparted a sense of lawbreaking, but this midnight gambit, conceived and supported by King Birendra of Nepal, rumbled through all the checkpoints with full cooperation of the police.

Murmuring mantras to ward off demons

We stretched our legs by the roadside, sore from a long day of riding elephants in hot pursuit of the rhinos now crated and bound for Bardia. To capture, immobilize and load three rhinos in eight hours required teamwork, luck and a blessing from the gods. Our day began at 6 A.M. as a local witch doctor, employed specially for the occasion, warded off the evil spirits and demons by murmuring mantras and shaking his body vigorously. Baddhai Subbha, our elephant supervisor, led a black goat into the woods to sacrifice to Bana Devi—the goddess of the jungle and the adopted patron of rhino catchers.

With the gods appeased, we headed off into the tall grass mounted on a Hannibal-sized contingent of elephants. We were searching for a young adult female we had spotted earlier. Part of our research in Chitawan, supported by the Smithsonian, includes a census of the rhino population; thus, all of the rhinos in this

Photographs by William Thompson



area had been photographed, numbered, named and registered, so that identifying them proved easy. Within 40 minutes we located the female but she was nearly three kilometers, or two miles, away from our darting site, requiring us to escort her through a sea of elephant-high grass. We encircled the female rhino and like Pleistocene cowboys herded her gently to the darting site, a drive requiring about 45 minutes.

Once we reached the site, Dr. Sunder Shrestha, a young veterinarian from Kathmandu, climbed aboard an elephant and moved in to dart the rhino. The dart, propelled by a .22-caliber charge, contained an extremely potent derivative of morphine, known as M99, mixed with a bit of tranquilizer. This knockout cocktail enabled us to immobilize two-ton animals with a few drops. More important, the effects of the drug could be reversed immediately with an antidote if the respiration dropped below safe levels.

Armor-plated and fastened with rivets

The muffled report of the dart gun broke the morning silence and the dart, trailing a tail of bright red chenille, stuck into and protruded from the rhino's rump. The inch-thick hide, wide skin folds and rear skin tubercles of a greater one-horned rhinoceros convey an image of an armor-plated animal fastened together with rivets. No wonder that the needles we employ to pierce this hide and inject the dose are two inches long.

We had to wait about 15 minutes for the drug to take effect. Immobilization of rhinos has become fairly routine for us, as we have successfully captured more than 25 animals for research work. Still, the unpredictable often happens and, with the day's first capture, it did. As if driven to take one last chance at escape, the rhino summoned her dimming wits and charged the elephants in an attempt to flee into the thick forest beyond the wall of pachyderms. The elephants met her challenge and trumpeted loudly. The rhino panicked and swerved, desperately trying to outflank them. Quick-footed elephants, posted at the edge of the jungle for just such an event, contained the rhino like outside linebackers until larger ones joined up to reencircle the animal. Perhaps resigned to its fate, the rhino stopped in its three-toed tracks and grudgingly lay down.

Once the rhino was immobilized, we tested to make sure that all of the drug had been injected. A sharp kick delivered to the rhino's buttocks and the lack of any response convinced us that the rhino was out cold. We moved swiftly to cover the animal's eyes and plugged its ears with coils of cotton to keep it calm and resting peacefully. Six of us scrambled over the length and girth of the sleeping giant, measuring everything from horn length to length of tail. Then we collected a small sample of blood and tissue, which will later be analyzed in a U.S. lab, to determine the population genetics of Bardia's founder stock. We drew a bit more blood for looking at disease history in the population. Concurrently, we carefully monitored vital functions like respiration and body temperature to ensure that the rhino was breathing properly and not overheating. Our work done in ten minutes, it was time to let the road crew take over.

Assistant warden Ram Pritt Yadav and chief mechanic Khuber Gurung began the loading operation. The loader scooped out several cubic yards of earth next to the sleeping rhino and workers slid into the ditch a 4-meter-long wooden sledge, padded with straw-stuffed burlap. Twenty well-trained staff pushed the rhino onto the sledge. After she was roped in place, the front-end loader towed her to the river edge. We propped up her head with a pillow to keep it well above the waterline. The loader chugged across the stream, earthmover become tugboat. As we sloshed along beside the rhino, we reflected on the preparations it took to arrive at this stage.

Before moving 15,000 tons of rhinos to Bardia, we had done our homework. We had studied the vegetation and feeding ecology of wild herbivores in Bardia. In the year prior to relocation, we made two visits to Bardia to identify several release sites where we hoped rhinos would settle. Our field research in Chitawan revealed that the animals are remarkably sedentary. Provided with sufficient forage, shade, drinking water and wallow sites, rhinos behave like homebodies.

The relocation effort was one of the first field projects supervised by the recently created King Mahendra Trust for Nature Conservation, a nonprofit organization dedicated to preserving Nepal's natural heritage, with support from the World Wildlife Fund-U.S. The chairman of the trust, Prince Gyanendra, the younger brother of King Birendra and Nepal's leading conservationist, took an active role in putting the rhinos on the road to Bardia. Bureaucratic tangles unraveled quickly, thanks to the Prince's activities and encouragement. To allay the fears of senior and junior officers concerned by the possibility of a rhino mortality in transit, the Prince advised them to consider that "this is an experiment. Treat it as such. The goal of rhino conservation is worth the risks involved in capture and transport."

Indeed, risks abounded. The change in rhino ZIP Codes from Chitawan to Bardia would require fully conscious animals to remain crated up to 18 hours.

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Team works quickly on immobilized animal. To reduce stress, its eyes are covered and coils of cotton

are tucked into ears. The man in plaid checks pulse, while men at right hold radio collar in readiness.

Relocating rhinos in Nepal



In the early morning, an assistant driver prepares to put wood-and-canvas saddle on his elephant.



Beginning of a 220-mile move to Bardia Reserve: a second crated rhino is lowered into a timber truck.

And once loaded in the trucks, the rhinos were in the hands of our truck drivers. Truck drivers throughout the world are of the same caste: tough, hardworking, independent in spirit. But we had no idea how drivers accustomed to hauling dead wood would take to hauling live loads. Nor could we be certain that the rhinos could handle the toss and tumble of the bumpy road to Bardia. To reduce stress on them, we chose to travel at night. Beyond these worries, we had to avoid dangerous river fords and be prepared to navigate around the stuck buses and trucks that often clog the dirt roads leading to Bardia.

Another concern was simply fitting a sleeping rhino into a crate. The front-end loader pushed the rhinoon-sledge to the edge of the crate. The sledge, connected by a strong torsion cable to a winch, was hauled into the open crate. We then closed the door of the crate and administered the antidote. Within a few minutes the rhino regained consciousness and its feet. The front-end loader then pulled the sledge from



Beginning of a 220-mile move to Bardia Reserve: a second crated rhino is lowered into a timber truck. Besides staff, most watchers are the villagers whose farmland adjoins the Royal Chitawan National Park.



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the crate as the rhino stepped off it, and the door was fully lowered. Generally, this step was accompanied by the rhino trying to bust up the crate. Fashioned from strong planks of sal wood, the best and heaviest timber tree of Nepal, the crate absorbed the rhino's body blows.

One rhino in hand, we returned to the jungle to catch the next two. We captured another female and subadult male that day, immobilized them and roped them to sledges. Belligerent when awake and upright, they seemed more like rubber squeeze toys when immobilized and prone. With their bright pink underbellies and relatively tiny hooves, one might conclude that the evolution of rhinos occurred in bathtubs rather than on floodplains.

At the loading dock our efforts to keep the scene orderly proved futile. When the rhino was to be pushed into the crate, the crowd of onlookers swelled even more, with locals vying for a chance to touch the sedated jungle celebrity. While concerned about stress on the animal, we found it hard to argue with the logic of one villager who asserted: "The rhinos come into our fields and eat our crops and we do not retaliate. The least we can do is to be able to touch one." A few locals slipped through the army detachment and, immediately after laying a hand on the rhino, each touched his own forehead in blessing. We followed suit and it brought us good fortune: by dusk, with all of the trucks loaded and the rhinos postmarked for Bardia, we rolled out of camp, beginning our nightlong westbound marathon.

Rhino habitat became rice paddies

As dawn approached, we traveled due west to the Karnali River, whose lush floodplains, forests and grasslands will be the home for these uprooted rhinos. The morning light revealed villages huddled by the roadside. The settlements looked as if they had appeared overnight, and in relative terms they had. Only 30 years ago the flat lowland jungles of Nepal, known as the Terai, supported high densities of rhinos, elephants, tigers, buffalo and other exotic megafauna, but very few humans. A deadly strain of malaria limited settlement in the Terai to a small group of natives -the Tharu-who were apparently resistant to the disease. By the early 1960s, a spraying campaign doused the Terai with DDT and freed Chitawan from malaria. A wave of poor hill tribesmen eagerly swept down to farm the flat arable land and convert prime rhino habitat to rice paddies.

One of the few jungles spared by land-hungry settlers was the Royal Bardia Reserve. While habitats were largely preserved, poaching decimated large ungulate populations. Under the careful stewardship of Nepal's Department of National Parks and Wildlife Conservation, the former hunting reserve was nursed back to health. After inauguration as a wildlife preserve in 1975, domestic grazing was stopped and poaching curtailed by the Nepalese Army. Bardia is now the gem of Nepal's National Park System, too isolated to be affected by human encroachment, well protected by the park staff and surrounded by sufficient buffer forests to absorb the impact of woodcutters. Clearly, Bardia was ripe for rhino reintroduction.

Once the rhinos were released there, the task of following them around fell to senior game scout Gagan Singh, a native of the area and a man who knows the reserve and its wildlife better than anyone. Although his formal education ended with the third grade, Gagan has amassed a PhD's worth of knowledge on the natural history of Bardia. He attends to all aspects of reserve management from building bridges, roads, guardposts and tree blinds to tracking tigers and wild elephants—on foot, of course. Gagan and assistants now will spend their days tracking rhinos around the reserve.

We stopped one last time to drink tea and check the rhinos. At the edge of the jungle, cosmopolitan peacocks were calling "New Yawk! New Yawk!"-the familiar, if geographically inappropriate, cry of the Terai morning. Quickly, the rhinos had attracted a small crowd of Tharu villagers, unsure if the rough beasts slouched before them were elephants or illusions of the dawn's mist. Most Nepalis have never seen live rhinos but know them well from the marketplace: they are pictured on the back of every 100-rupee note. Rhino products figure prominently in local medicine and folklore. Topical application of rhino urine is said to cure ear infections and, taken internally, it cures asthma and tuberculosis. Rhino dung is smoked in a pipe to cure fever, and a powder from the ground-up horn is sold as an aphrodisiac in Hong Kong. Whether from good sense or the fear of stiff penalties, Nepali villagers seem uninterested in the horn but will pay good money for high-test urine.

At last, after crossing three rivers, bypassing two stuck trucks and braking for numerous herds of cows grazing along the highway, we reached Bardia and the release site. After 18 hours in the crate, the restrained rhinos might be ready to burst out of their chutes like Brahma bulls at a rodeo. Thinking ahead, we had brought along all of Bardia's domesticated elephants to keep order at the release site. We had forgotten, though, that Bardia's elephants had never seen a rhino before. The door from the first crate was opened and out rushed a female rhino. Roaring and honking, she charged straight at the elephants, galloping at full tilt for the Bardia state line. Scared out of their wits, the elephants trumpeted loudly and bolted for the trees, and for a few moments it was pachyderm pandemonium. Fortunately, the release site was a large open grassland and the drivers managed to halt their runaway steeds before they reached the forest edge, where surely both human and tree limbs would have been broken. The drivers guided their nervous elephants back to their stables to be tethered. Soon the inexperienced pachyderms would win sparring bouts with rhinos, but today Round One was awarded to the challenger from Chitawan.

The next animal to be released, a subadult male, trundled out, looking for something in his path to crush. Finding nowhere to vent his frustration, he

After successfully capturing a rhino, the party returns through the hazy morning to Smithsonian

loped off, emitting the peculiar huffing sounds rhinos make when running in retreat from danger. The last animal to be released for the day, a female, experienced no trauma and merely ambled out of the crate. With nostrils flared, she inhaled the sweetness of freedom. As she sniffed the new real estate, we hoped she would decide to go forth and multiply. (To encourage breeding in captivity, Prince Gyanendra recently gave two young female rhinos we had captured to the National Zoo in Washington, which already had an 11year-old male.)

These three rhinos were eventually joined by ten other one-horned colonists. In late December, seven days after starting the capture operation, we left Chitawan with the last contingent of three rhinos. By now, word had spread through every village along our route about the contents of these curious timber trucks. In a country where few can afford radios and where television is limited to Kathmandu, word of mouth serves admirably as a low-tech, effective mode of communication. Villagers were already lining the east-west highway, euphoric after a day of celebrating King Birendra's birthday. So when the people saw the nowfamiliar timber trucks hauling giant crates roll by, they waved their Nepalese flags. Children ran after the trucks shouting, "Gaida aayo! Gaida aayo!" ("The rhinos are coming! The rhinos are coming!"), a fitting tribute to the passing-by of a national symbol.

The preservation of Nepal's religious shrines has drawn international support and popular acclaim from a devout nation of Hindus and Buddhists. It is up to conservationists to elevate the theme of restoration ecology, in which rhino relocation figures prominently, as a goal as important as the restoration of a temple or a monastery. There is one critical difference. Provided local expertise and sufficient funding, religious shrines can be re-created. Once the rhinos are gone, however, no amount of conjuring or massive expenditure of funds can ever return them to the wild.

During important Nepalese festivals people often carry religious objects from one temple to another. Our transplant of rhinos from Chitawan to Bardia was a similar procession, and next year eight more rhinos are slated to be shifted from one jungle shrine to another. For the greater one-horned rhinoceros, the road back from the brink of extinction, like that bumpy track to Bardia, is often slow and tortuous. At least in Nepal, the journey is well under way.

Research Camp in Sauraha, Chitawan. Coauthor Dinerstein is on long-tailed elephant sixth from left.