

Stumptail and Company

Misty mornings and chilly nights in rhino country

by Andrew Laurie

Shortly after midnight I awake. It is a warm, unusually clear July night. A yellow path of reflected light stretches westward across the river to the setting moon. Pinpricks of light flash incessantly along the bank, tracing the slow, circling flights of fireflies. The constant insect chorus is drowned suddenly by the strident croaking of a frog in the pool behind my thatched hut. Whirlpools gurgle and waves roar in the swollen river. Upstream, part of the bank caves in with a splash, and the dark silhouette of a leafy tree floats slowly past.

More splashes: Something is moving at the water's edge. Curious, I sit up to investigate and almost immediately, less than ten yards away at the top of the bank, appears the wide, heavy jowled face of a bull rhinoceros. Deep folds of skin fissure his neck, and a large bib hangs beneath his chin. Tiny eyes look forward from each side of a stumpy horn, and large ears stand erect on the top of his head. His right ear is torn and a strip hangs loosely from the edge.

I watch in awe from my verandah as he walks past, only ten feet away. His horny lips rhythmically crop the lush grass, and his wet flanks gleam in the last of the moonlight. Cautiously, nose outstretched and sniffing loudly, he approaches my rain gauge, backs off with a start, and approaches again even more slowly. This time he rocks the tall alloy cylinder until it rattles. Startled again, he walks quickly into the forest with a quick rumble of his lips, lifting his stump of a tail and squirting jets of urine up to ten feet behind him. I describe the encounter in my notebook and return to bed.

Stumptail, as I call that particular bull, is an ancient beast of an ancient race. He has an air of permanency, aloofness, and indestructibility about him. His ancestors have been roaming the swamps, forests, and grasslands of the Himalayan foothills for millions of years. Pliocene fossils of *Rhinoceros sivalensis* differ little from the present day *Rhinoceros unicornis*, the greater one-horned rhinoceros of India and Nepal.

Five-and-a-half feet high at the shoulder, Stumptail weighs about two tons. Folds in his thick, scarred, and studded skin resemble joints in armor. When he yawns he displays a pair of razor-sharp canine tusks, which are used for combat in preference to the horn that grows from the skin of his nose. Since I first saw Stumptail in December 1972, he has lost half his horn and had one ear torn to shreds. I observed and re-

corded his movements and activities for two-and-a-half years, as part of a study in the Chitawan Valley of southern Nepal of the second largest remaining population of the greater one-horned rhinoceros in the world today.

Previous encounters with this animal spring to mind in profusion, each spiced with the special flavors of the different seasons. I think of cold November nights with brilliant moons and opaque white mists. On one such night Stumptail walked confidently from the forest across a field newly sown with mustard and headed for the rice paddies. At first he was chased noisily from field to field by the irate men who guard their crops by night from flimsy platforms with conical thatched roofs. Later, when the mist descended and fatigue overcame the farmers, Stumptail fed steadily for two hours on rice ripe for harvesting, before he was discovered and chased out by a band of men with flaming cane-torches. He trotted back to the forest puffing like a steam engine, leaving a two-foot-wide trail of flattened and torn-up rice behind him. I continued my watch through the night as he lay on a river bank in the swirling mist. As I sat on a stranded simul trunk, drowsy, despite the cold, I was startled by the sudden loud, choked alarm-bark of a sambar deer who ran off with long, splashy leaps across the river. Stumptail did not stir.

The moon set. There was nothing to see but the gradual lightening of the eastern horizon—a line of trees and a gap for the river. Invisible, the sun lighted my surroundings; then a slight yellow tinge appeared in the east above the thickening mist. Over the trickle of the water in the river, I heard a rhino cross upstream and stop to urinate in the middle. Spurwing plovers and red-wattled lapwings disturbed the peaceful droning of the crickets. A tiny blue and red kingfisher winged swiftly by, hardly an inch above the rippling water. I could hear a flock of parakeets approaching, their noisy squeaks and squeals audible from afar. Suddenly, they appeared overhead—a close formation of hazy silhouettes. Tails spread fanlike—the central plumes vibrating—they wheeled and descended steeply to land in a tree behind me.

Stumptail rose and started munching waterweed at the river's edge. A sambar hind and her half-grown calf trotted quickly out from the bush behind me. They paused in the open and turned to face me, before

Grassland, woodland, swamps, and wallows (see page 4), all provide good habitat for rhinos.



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raising their tails and fleeing unhurriedly, white rumps exposed and conspicuous in the mist. A white-breasted kingfisher swooped up to land on a simul trunk and surveyed the falling river. More mud had appeared, uncovered by the river, to provide fresh surfaces for recording the night's activities. Sambar, rhino, chital, wild boar, and leopard had all left their marks.

I also remember Stumptail in March, grazing on the lush new grass that shoots up after the annual burning. The old, bare grass canes resembled a forest of porcupine quills; the leaf sheaths were burnt black and encircled the pale stems at intervals of a foot or more. The canes rattled and cracked as Stumptail pushed his way slowly through them, out of sight. I was watching with my brother, Ranald, from the top

of a simul tree, with its large red flowers and fat green buds within arm's reach. The sun was accelerating toward the horizon. We had decided to leave, when suddenly Stumptail reappeared at a canter in pursuit of Spindly, an adult female. He uttered loud rhythmic squeaks and pants until he caught up with her. They walked away, Stumptail with his head on Spindly's rump. Following on foot we came around a corner to find them mounted, Stumptail's huge wide jowled face and wrinkly nose peering at us from a great height over Spindly's thinner face and long, curved horn. We retreated quickly to nearby trees and watched for thirty minutes as they shuffled about. It was dark when Stumptail finally dismounted and lay down with a long sigh. Spindly moved off to graze and we tiptoed past, cautious and exhilarated.

The courtship behavior of rhinos is often aggressive, and the result, as the author says, is impressive.



Simon Michell

And I recall a May afternoon, as I stood, with a rope for support, on the back of Devi Kali, one of His Majesty The King of Nepal's elephants, which had been lent to me for my project. Naran, the driver, sat on her neck and urged her on with his toes behind her ears. The weather had been fine, but now the sky darkened and there was a strong wind from the south-east. "*Dhudhui yewe borrieu*" said Naran, "The dust storm is coming." A waving sea of ten-foot-high grass blew toward us, the shiny leaves undulating about Devi Kali's head. The noise of the wind was loud in our ears—louder than the rustling grass, the elephant's steps, and her rattling neck chain. There was almost total cloud cover.

The *dhudhui* was in sight: Billowing over the ground like the arm of a giant amoeba, it obscured the

hills from view and filled our eyes and mouths with dust. Trees bent westward, straining. Leaves, twisted and inverted, displayed their light green undersides. Mynahs hopped with the wind from tree to tree, or clung with bee-eaters to the frantic branches. A crested serpent-eagle dropped like a stone from the sky and sought refuge in the forest. But, there, a few yards ahead of us, Stumptail was grazing, oblivious to wind and dust and the first drops of rain: solid, permanent, unmovable.

I remember Stumptail on a July morning, wallowing in a smelly green pool, with the monsoon rain pouring steadily down his enormous ridged back. He flapped his ears occasionally to scare the frogs which hopped slowly up his face and flanks. I had been watching and listening since well before dawn, seated

Swamp deer still share the habitat with rhinos in Kaziranga, but the deer have disappeared from Chitawan.



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in a little thatched shelter beside the water, with my tape recorder, camera, binoculars, and notebook near at hand. Beyond Stumptail I heard a slow, steady munching noise and a short ventriloquistic grunt; a cow and calf rhino were approaching, eating the hard, green fallen fruit of the *belar* tree, *Trewia nudiflora*. I prepared for action.

They arrived: Flapper and her six-month-old calf. I recognized Flapper by her closely set ears, her long curved horn, and an enormous loose appendage of skin that flaps from her rear left belly-fold as she walks. Stumptail did not move as she and her calf stopped at the edge of the pool to drink the foul water. Flapper took a step into the pool; Stumptail snorted and raised his head. Flapper advanced again. Stumptail rose to his feet. Flapper faced him—head low,

mouth open, tusks displayed—and bleated long and loud as he advanced silently. She backed away, her calf behind her, lunged once more to enable her to turn, and then trotted after her little calf. Stumptail returned to his resting place. He looked briefly toward Curvy and Nosy lying three yards away, and flopped down in the water himself; I was left wondering why Curvy and her calf were allowed to stay, but Flapper was driven off.

As I look back on all I have learned from Stumptail and the other rhinos I have watched, I find myself wondering about their lives. Was Stumptail here, roaming the same few square miles of forest in 1938 when the Maharajah Joodha shot 120 tigers and 38 rhinos during the three-month hunting season in

River erosion and flooding are serious threats to Chitawan National Park and its rhinos.



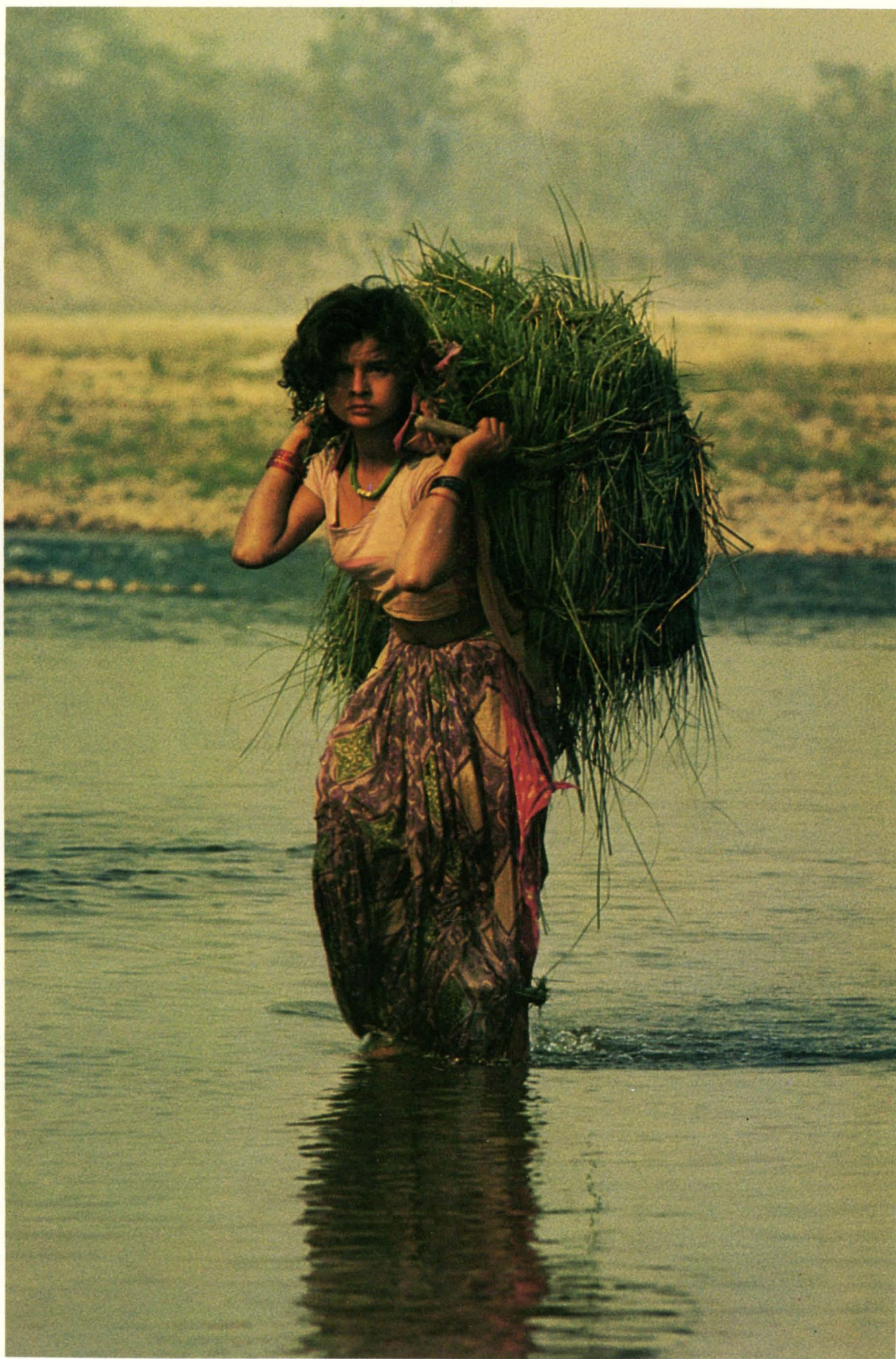
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Chitawan? How has the sudden increase in the human population of the valley affected him? I know it has proved fatal in other regions.

Rhinoceros unicornis once ranged from the Indus Valley to northern Burma. The Moghul Emperor Babur hunted rhinos near Peshawar in the early sixteenth century. Until the last century, two other species of rhinoceros lived in India. The Javan, or lesser one-horned, rhinoceros (*Rhinoceros sondaicus*) was found as far west as Bengal, but is now limited to Ujung Kulon in western Java and scattered localities in mainland southeast Asia. The Sumatran two-horned rhinoceros (*Dicerorhinus sumatrensis*) is probably restricted to Sumatra, West Malaysia, Borneo, Burma, and Thailand. Both species probably number less than 150 individuals in the wild and

there are none in captivity. *Rhinoceros unicornis* is found today only in the Brahmaputra Valley in Assam, two small reserves in West Bengal, and the Chitawan Valley region of the Nepal Terai. There are fewer than 1,200 in the wild—over half of them in Kaziranga National Park in Assam, India. Between 250 and 280 are found in and around the Royal Chitawan National Park in Nepal.

The Rapti River of Chitawan flows parallel to and between the two outer ranges of the Himalayas, the Mahabarat to the north and the Siwaliks to the south. This low-lying valley, or *dun*, is known as Chitawan. It is an area famous for its wildlife and forests. Twenty-five years ago the human population was very small. Tall *sal* forest (*Shorea robusta*) covered the hill slopes. Torrents of water swept down rocky stream



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Nepal is primarily an agricultural country, with little or no industry. At left, a girl carries fodder for the farm animals. Along the river, men repair a large fishing-trap (above). A land-locked kingdom, which stretches 500 miles along the southern slopes of the Himalayas, Nepal was opened to foreign visitors less than two decades ago.

beds in the monsoon season and dried to trickles in the winter. The valley bottom was a constantly changing pattern of up to twenty-foot tall *Themeda* and *Saccharum* grassland and riverine forest, including the red-flowered simul tree, *Bombax malabaricum*. The Rapti River meandered across the valley, destroying forest and grassland in the monsoon floods and building up soil elsewhere. Abandoned river beds became swamps and lakes with reeds around the edges. Prickly thickets of *Calamus* climbing palm filled drier woodland areas.

A rich and varied fauna lived here: Elephants, rhinos, tigers, leopards, bears, boars, buffalo, gaur, and five species of deer were abundant. Aboriginal races—the Tharus, Botés, and Darres—resistant in some degree to the omnipresent malaria, inhabited scattered villages in the forest. The Rana family, who were Nepal's hereditary prime ministers, hunted in Chitawan in the cool winter months. They invited foreign royalty and used hundreds of riding elephants to pursue tigers and rhinos. The hunts were infrequently in the same area, so populations suffered little, despite large numbers taken in some years.

There may have been over a thousand rhinos in Chitawan in 1950. Killing a rhino was a capital offence in those days. During that decade, there was a change of government, followed by a vast influx of people into Chitawan. Previously, blacksmiths, goldsmiths, and tailors had arrived during the dry season but were always driven back or killed off by malaria in the summer monsoon months. A malaria-eradication scheme enabled thousands of overcrowded hill people to resettle in the fertile Rapti Valley. Vast areas of land were cleared for agriculture. A road was built and bazaars sprang up along its route. By 1959 the whole fifty-mile length of the valley was settled.

Forest areas were rapidly disappearing, and thirty to forty cases of rhino poaching were discovered each year. The blood, skin, bones, and urine of rhinoceroses are believed by some people to have aphrodisiacal, medical, and magical properties. Greatest powers are attributed to the horn, and the main consumers are the Chinese. Horn is being sold in Bangkok today for nearly \$900 per pound, so the temptation to poach is considerable.

In 1964 the Nepalese Government cleared settlements from south of the Rapti in the lower half of the valley and stepped up the poaching control. Poaching

and habitat destruction continued, although at a slower rate. Swamp deer and buffalo disappeared from Chitawan, and the rhino population continued to decrease. Toward the end of 1972, legislation was finalized for the gazetting of the Royal Chitawan National Park—Nepal's first such sanctuary. I arrived in December 1972 to make a detailed study of the rhino. To help in determining conservation measures, information was needed on numbers of rhinos, their distribution and habitat preferences, movements, feeding behavior, reproductive rate, and social organization.

It is a slow job learning about the rhinoceros' lifestyle. I spent hours watching while they did nothing. Rhinos are active mainly after dark, so I often worked at night, following them on foot or by elephant, or watching from blinds. With an instrument known as an image-intensifier, I was able to recognize individuals even on starlit or moonlit nights. During the study I distinguished 170 individual rhinos. I took photographs and made drawings; I wrote descriptions of horn shapes and sizes, of ear cuts, scars, bumps. I noted the variations in the thirteen main folds on the body and in the arrangement of the skin "studs" on the rump. One young female could be recognized even when she was out of sight by her permanent asthmatic wheeze.

Most rhino movements are local and related to the availability of different foods. Rhinos eat a wide variety of plants, many of them available only seasonally. After the jungle fires in February and March, the grass regrowth provides good grazing. Aggregations of up to ten or twelve rhinos may be found within 200 yards of each other. A conspicuous feature of "rhino country" is the numerous piles of dung on paths and near water. All rhinos use these dung piles. They seem to act as "signposts" to the good grazing grounds and wallows, as well as sources of information about which rhinos are in the area.

As the rainfall starts to increase in May, new grass and waterweeds grow in the stream and riverbeds. More time is spent near the forest edges and outlying jungle belts next to the fields where the maize crop is being planted. There are some rhinos who never visit the tall grass jungles but remain year-round in the scrubby secondary forest outside the park. There they graze on short star grass (*Cynodon dactylon*) with domestic cattle and buffalo, and browse on a

variety of shrubs, some of which are unpalatable to domestic stock. Many rhinos have probably taken to crop raiding only recently, as the forest areas decreased and their former ranges became filled with highly nutritious crops. In Kaziranga also, the rhinos raid the rice paddies. Damage to the fields nearest the forest can amount to twenty percent of the crop. Other crops eaten by rhinos include maize, potatoes, wheat, and chilies.

Although many rhinos may be seen grazing or wallowing together, they are generally solitary in habit and move independently of one another or in small groups. The most permanent associations are between cows and their calves. For over three years they remain together, the mother only driving the youngster away shortly before the birth of a new calf. I have known one calf to stay with his mother for over four-and-a-half years.

Physical contact is very important in the mother-calf relationship. A young calf will rub his head and flanks along the mother's body, often climbing onto her back if she is lying down. It will bite her ears and horn and lick her skin. Frequently the calf spends long periods running around the mother, sometimes picking up a stick in the mouth and charging back and forth with it like a young puppy. The mother is rarely interested in this game, but if disturbed incessantly she will stand and suckle her calf from the side or between the hind legs. Nursing continues with decreasing frequency until the calf is over two years old.

Calves are always curious to initiate encounters with other rhinos, but mothers chase off strangers, sometimes quite fiercely. While the calf is familiarizing itself with other members of the community, the cow is protecting it from possibly hostile advances by others. It is normally cows with calves that attack humans; I recorded five fatal cases. In view of this, it is odd that cows sometimes leave their small calves unattended while they graze maybe 500 yards away. I observed this on several occasions with calves less than six months old. On one occasion the cow was absent for more than ninety minutes. Abandonment of the calf is dangerous behavior where there are tigers; until they are about eight months old, calves are small enough to be taken by this big cat. Two calves were killed in Chitawan in two-and-a-half years; Kaziranga may lose six each year to tigers.

Painted on all four sides of the Swayambhunath stupa are the "lotus eyes" of Buddha.



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"Running around mother" is a common game for a rhino calf. Physical contact is important to the mother-calf relationship, which lasts for more than three years, when the next calf is born.

After a year from the birth of her calf, the cow may come into estrus again. Normally she is fertilized after two years, and the new calf is born after a sixteen-and-a-half-month gestation period. The behavior of a calf changes when it has finally been driven from its mother. It is subject to attacks by adult males in the area, and responds to this risk by fleeing at the slightest hint of danger. It will stand alert at the cracking of a twig or the approach of any animal. Even the sound a bird makes as it lands can cause a calf to panic-flight. The risk of attack seems to be reduced by association with other subadults (calves which have recently left their mothers) or another cow-calf pair.

Aggressive interactions are frequent. Five male rhinos were killed by adult males during the period of my study—that is, nineteen percent of the total number of deaths recorded were due to hostile encounters or fighting. In May 1975, Scar-rump, an adult male, died from wounds inflicted by Stumptail's tusks, which laid bare the whole of the right side of Scar-rump's neck to the vertebrae. In May 1974, an adult male, Bhalu, attacked the young male Bub repeatedly over a period of ten days, despite the young one's bleats and roars. Bhalu threw him with his horn and slashed him with his tusks until Bub lay motionless; he died a few days later.

Attacks are not limited to males. In July 1973 Gertie was in estrus. Mr. Plod chased her and they fought face to face. Gertie turned to run and Mr. Plod put his head between her front legs from the side and lifted her, grunting, head over tail onto her back. Although Gertie was unhurt, there have been cases both in Chitawan and Kaziranga of cows dying as a result of mating chases.

Male rhinos fight among themselves but not over territory. A defeated rhino may or may not vacate the area of a conflict, but can often be seen later grazing or wallowing with his opponent. Nor are fights related directly to mating. A number of males who know each other may live peacefully in the same home range. Strong, self-confident males display by squirting long jets of urine behind them from their backward-pointing penises. They also drag their hind toes in the earth while walking, to make long, parallel furrows. Stumptail, Triscar, and Mr. Plod all display frequently, yet they share the same range and court

females in the same area without conflict. One male may be grazing unconcernedly a few yards from a courting pair and the roles may be reversed two weeks later. On only one occasion did I see two bulls following an estrus cow. It is possible that the male's sexual activity is periodic and therefore there would have to be more than one breeding bull in an area to ensure fertilization of all estrus females.

The strong males appear indifferent and even curious when disturbed. They may follow human scent instead of fleeing from it. They also go toward the sounds of any fights, whether actual, tape-recorded, or imitated by my voice. There is pressure on the weaker males to avoid contact with the strong ones, to stop displaying, or to leave the area. Strange males who do display are attacked fiercely: Scar-rump was a tragic example of this behavior.

The adult sex ratio in Chitawan is 100 males to 135 females. Males are more nomadic and move away from their birthplaces to a greater extent than do females. My main study area in Chitawan had a particularly high population density—about five per square mile. No habitat deterioration is noticeable at this density. However, social factors are starting to limit the population, both by direct aggression and probably as a result of increased stress among cows with calves who fight at wallows and wherever else they come into close contact. The inter-calving interval is longer and thus the birth rate is lower in the more populated region. This high-density area is on the edge of the national park and demonstrates the attractiveness of the forest margin as rhino habitat. It provides good year-round feeding in both tall and short grassland, woodland, swamps, rivers, and agricultural land. Wallows are also plentiful, an important requirement in the warmer months.

Poaching has been successfully controlled in Chitawan since its designation as a national park. There were nine proven cases in 1972, four in 1973, none in 1974 and only one during the first half of 1975.

The Fauna Preservation Society of London provided money for rewards for information leading to the arrest of rhino poachers. The first park warden started work in December 1972 and has done an excellent job in rounding up poachers. There is now a well-built park headquarters funded by the Food and Agricultural Organization in Rome, the United Na-

tions Development Program, and His Majesty's Government of Nepal. The presence of Tiger Tops, a jungle lodge in the west of the park, has undoubtedly helped in controlling poaching and stock-grazing. It has stimulated great interest in Chitawan and brought in tourist revenue for the Nepal Government.

Stock-grazing within the park is under better control, and so is the annual cutting of thatch grass by the local villagers. Present birth and death rates in Chitawan show an increase in the rhino population of about two percent each year. Food is plentiful. Most of the rhinos could live the year-round within the borders of the national park but they prefer the marginal habitat.

The main problem connected with rhino conservation is that of crop-raiding. Losses to rhino and wild boar will become less tolerable as human and domestic animal populations increase. At present, raiding is philosophically accepted by the local people as inevitable—a refreshing change from the complaint by a farmer near my home in England that a family of badgers was playing in a corner of his field and flattening the corn. Fencing of the park boundaries has proved ineffective. Rhinos walk through or around them, and there are always waterways which circumvent the strongest fences. Some of the depleted forest areas outside the park serve as daytime refuges for nocturnal crop raids. To discourage this use and to scare the rhinos in the fields might change their culturally inherited movement patterns.

Compensation for crop damage is a possible solution. Most of the rhino damage occurred within 800 yards of the park boundary. Only three out of ten areas surveyed had serious losses, and those were all in the eastern high-density area. This means that at present relatively few farmers are seriously affected.

The conservation problems are similar in Assam and Bengal, although poaching is still common in one or two of the smaller Assamese reserves. With only 1,200 rhinos remaining in the wild and eighty percent of those in two national parks, which combined are less than 400 square miles in area, the situation is not

as secure as it might be for the preservation of this species. There is a danger of epidemic disease destroying the main populations.

River erosion and flooding are also serious threats. Kaziranga is totally flooded annually by the Brahmaputra and if that river changes its course southward, the results could be disastrous. Already ten percent of the park area has been lost through erosion. The Rapti River could similarly slice into Chitawan National Park. As deforestation increases in the hills, the flood levels in the plains become higher with each successive monsoon season. The river changes its course annually and, under the present legislation, the northern border of the park is the Rapti River. Any alteration in the course of the river toward the south will decrease the area of the sanctuary.

To safeguard against these dangers, it is planned to re-introduce rhinos into some reserves in India and Pakistan. Some may be taken from Chitawan to Lal Suhanra in Pakistan in 1976. It has also been decided to extend the Royal Chitawan National Park by about 100 square miles. This will include a salient of agricultural land from which the human population will be moved. The area will quickly revert to grassland; the boundary with the fields will be shortened and it is hoped that crop-raiding will diminish.

The riverine grasslands of the Himalayan foothills have been reduced to tiny pockets. The rhinos have retreated with them, having lived there for millions of years. The Nepal and the Indian Governments are aware of their responsibility toward these huge beasts. Let us hope that in the face of increasing human populations, they will continue to protect the rhinos as the priceless heritage that these animals are. □

Andrew Laurie's study of the rhinos of Nepal was supported by the New York Zoological Society, under the Center for Field Biology and Conservation. He is presently completing work for his doctorate degree in the Department of Applied Biology at the University of Cambridge in England.



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Elephants are still used for transportation in Nepal, especially during the heavy rains and high rivers of the monsoon season.