



RHINOCEROS FALLS into a trap in the Kaziranga Wildlife Sanctuary in Assam, India. Here, rigid protection of the great beasts has allowed them to thrive, unlike rhinos in

other areas. As a result, the Indian Government is able to permit, under strict supervision, the legal trapping of a few of the animals for exhibition at approved foreign zoos.

MARCO POLO'S UNICORN

The Indian rhinoceros fights for its existence
as humans hunt it and encroach on its habitat

By LEE M. TALBOT

THE WORLD HAS LOST at least one hundred and seven kinds of mammals since the time of Christ, and most, if not all, of these departed species and subspecies owe their extinction to man's activities. These same activities, today, have brought at least another six hundred forms to the point where they may be considered threatened with a similar fate.

Perhaps at first thought a hundred extinctions spread over two thousand years does not seem a particularly urgent matter. The urgency becomes clear, however, when one considers that the rate of extermination—like the rate of the world's human population growth, with which it is closely associated—has sharply accelerated in recent years. Nearly seventy per cent of the losses have occurred in the last

century and almost forty per cent within the last fifty years. Put another way, up to A.D. 1800, one kind of mammal was exterminated each fifty-five years; during the next century, the rate increased to one each year and a half; and, since 1900, man has exterminated roughly one form every year! And this number refers only to mammals. No one has made a similar tally of reptiles, amphibians, fishes, or insects; but we do know that since 1639, when the last dodo is thought to have died, over a hundred other bird forms have been exterminated in one way or another.

Man accomplishes this destruction in two ways. The obvious way to destroy an animal is to kill it. Throughout history, mankind has hunted or trapped animals for the sake of ani-



mal products, for protection, to remove competition, and for sport. Less obvious than killing, but far more threatening to the species' survival, is habitat modification—indirect and often unintentional destruction. An animal does not exist by itself, isolated and independent. Rather, it might be considered as the center of a complex ecological web, whose radiating strands are the animal's requirements for or associations with food, water, cover, climate, disease, parasites, and predators. All these strands, in turn, are interconnected and make up, in sum, the animal's whole habitat. The animal's survival may depend on the web being intact.

A few human activities—such as cultivation, flooding, and tract construction—virtually annihilate entire habitat webs and the results are easy to see. Less easy to recognize are the effects of those human activities that alter only a part of existing habitats. Livestock-grazing, too, acts on the habitat web through direct competition for food and water, alteration of vegetation, erosion from overgrazing, and the introduction of parasites and diseases. Fire alters or destroys vegetation, soils, and watersheds. Accidentally (or even intentionally) introduced exotic species compete with or prey on native species. Regardless of the form such habitat modification may take, it is an almost inevitable



KAZIRANGA SANCTUARY provides visitors with facilities for viewing rhinoceros, *left*, from the back of elephant, *above*.



HEAVY STEEL CAGE, which will hold the captured rhino, is moved on rollers into the area where a pit trap has already

been prepared. Domesticated elephants, traditionally fearful of the rhinoceros, must be especially trained for this work.

concomitant of human activities; so much so that it is difficult to find any area of the earth's surface that has not been changed in some fashion by man. The extent and degree of this change are usually in direct proportion to the numbers of humans involved. Consequently, as the world's human population rapidly expands, animals with extensive or inflexible habitat needs are being literally squeezed out.

THE great Indian rhinoceros, *Rhinoceros unicornis*, provides an outstanding example. In ancient times, the rhinos were among the most common and widespread land mammals. Today only five popularly recognized forms survive, the black and the white rhino, both of Africa, and the Javan, the Sumatran, and the great Indian rhino, of southern Asia. All of these are now considered to be threatened species.

The rhinos of Africa are widely known, but it comes as a surprise to many to learn that rhinos are also found in Asia. Interestingly enough, Western man learned of the Asian forms before he heard of the African ones. In 1293, Marco Polo wrote: "There are wild elephants in the country and numerous unicorns which

are very nearly as big. They have hair like that of a buffalo, feet like those of an elephant, and a horn in the middle of the forehead which is black and very thick. . . . The head resembles that of a wild boar and they carry it ever bent toward the ground. These unicorns like very much to stay in the mud. It is a very ugly beast to look at and is not at all like the one our stories say is caught in the lap of a virgin. In fact, it is altogether different. . . ."

The country of which Polo wrote was Sumatra, and his "unicorn" seems to be a composite of the Sumatran and Javan rhinos, both of which were found there at the time of his visit. Excepting one item, "hair like that of a buffalo," which is characteristic of the Sumatran rhinoceros, the Venetian traveler's description also well fits the Indian rhino.

It is the largest Asiatic rhinoceros, and some individuals may reach a height of nearly six feet at the shoulder and a total length of more than fourteen feet. The weight of a large adult has been estimated at more than two tons. Its thick hide hangs in great folds, giving the appearance of armor plating. Rivet-like tubercles, studding the legs and flanks, further enhance this effect.



This article was written by Mr. TALBOT, a doctoral candidate at the University of California, following a mission he undertook for the UNESCO-sponsored International Union for Conservation, on which he surveyed the status of the world's most threatened animal species. Photographs are by KENN REED, except for those on pages 559 and 561, which the author took while he was in India.



CATTLE EGRET eats the insects that collect on rhino's hide, also warns the weak-sighted beast of approaching danger.

ALERTED RHINO senses alien presence of man and pauses to peer myopically about before emerging from mud wallow.





LABORERS dig a path that gradually deepens, *above*, to six-foot level of pit, into which the rhinoceros blundered.

LAST OF EARTH between beast and man is hacked away, *below*, as cage, with door opened, is brought into position.



The skin is hairless, except for a fringe on the ears and tail and, as with other rhinos, the observed color usually is determined by the mud of its most recent wallow. A clean specimen is brownish gray, with a very slightly pink or reddish tinge at the edges of the skin folds, ears, and nostrils. The single horn is thick and usually blunt; it may reach two feet in length, but probably averages a little over one foot.

THE Indian rhino's horn apparently is little used in combat. It is relatively soft, and grows from the skin as do hair and fingernails. It is not even very firmly attached to the animal's skull and a heavy blow can loosen or even rip it off. In fighting, this rhino uses its teeth, two long, sharp, lower incisors, with which it bites or rips much like a wild boar. With these it can inflict considerable damage, even on elephants. Thus a factual basis underlies Polo's seemingly fanciful statement that unicorns "... do no harm with the horn, however, but only with the tongue, for this is covered with long hard thorns and when the unicorns are angry they hold their victim under their knees and grate him...."

Rhinos are vegetarians. They feed both day and night, eating grasses, water weeds, leaves and twigs. Much of their time is spent in a mud wallow, especially during hot weather. In spite of its armor-plated appearance, rhino hide is quite sensitive. A relatively slight scratch will draw blood, and the wallows may serve to allay both sunburn and the attacks of insects that inhabit the wet areas where rhinos are found.

WATER BUFFALO, gaur, various deer, wild pigs, and other animals may be seen peacefully feeding near rhinos, the pigs sometimes even sharing the same wallow. This tolerance does not extend to elephants, however. Rhinos and wild elephants apparently try to avoid each other; and most domestic elephants are terrified of rhinos, refusing to approach them closely and occasionally even bolting at the sight of them. Myna birds and cattle egrets are the rhinos' virtually constant companions, often riding their backs and providing an early warning system for the rather weak-sighted beasts. Aside from man, the tiger is probably the only predator

the rhinos need fear, and the latter kill only rhino young.

Marco Polo also mentioned unicorns in Burma and western India. In his time, the westerly boundaries of the Indian rhino's range were the foothills of the Hindu Kush, near the Khyber Pass, and the bush country south along the Indus River. The northern limit was the frontier of Kashmir and the foothills of the Himalayas. The southern and eastern boundaries are uncertain. Indian rhinos were certainly found as far south as the Bay of Bengal and as far east as Burma. They may have ranged all the way to the shores of the China Sea, for one-horned rhinos have been reported from Malaya, Thailand, Indochina and south China. But these reports may refer to the smaller, Javan rhinoceros. In any case, in Polo's time, the Indian rhino

ranged much of the Indian subcontinent and, possibly, southeast Asia.

By 1900, the Indian rhino's range had shrunk to two valleys at the foot of the Himalayas. At that date, the last rhinos known to be in India were scattered in about a dozen isolated pockets along the Brahmaputra River in Assam and Bengal, and the largest single known population was estimated at twelve animals. An additional rhino population, of unknown numbers, lived in the Chitwan Royal Hunting Preserve, in the remote Rapti Valley of the Kingdom of Nepal. Hunting and habitat encroachment had brought about this drastic cut in a once widespread population.

BUT the rhino's greatest misfortune is that he carries a fortune on his nose. Since very early times, "unicorn" horn has been credited

with marvelous medicinal and magical properties. Drinking vessels made from it supposedly rendered poison harmless, and thus were standard equipment for numerous Eastern and Western rulers until quite recent times. Properly prepared and applied, potions of rhino horn were believed to aid recovery from wounds or sickness, to reduce pain, ease childbirth, and to possess rejuvenating powers. These beliefs also extended to every other part of the animal's body and its bodily products. So great has the faith in these qualities remained in the Orient that prices as high as \$2,000 have been offered for a single horn, and a poacher could make the equivalent of several years' normal wages from one whole rhino. Considering all this, the wonder is not that rhinos were rare by 1900 but that they still existed at all. And yet,



CONFINING ROPES, which have kept the animal from breaking for freedom, are now slackened and the rhinoceros, following

its only possible course of action, moves directly into the cage as Indian trappers and workmen watch apprehensively.

important as was hunting pressure in reducing the rhinos, it was probably only a coup de grâce to a population already in desperate straits.

As the human population of India increased, so did the amount of land occupied by villages or used for cultivation and grazing. In the six hundred years following Polo's travels, much of the northwestern part of the rhino's range in India had become increasingly arid and untenable as rhinoceros habitat, largely because of population pressure and land abuse.

As the fertile lowlands were taken over for agriculture, the rhinos retreated to the sparsely inhabited hills. To this area they were followed by different varieties of agriculture (largely rice and tea), by grazing livestock, more intensive land use and, of course, more people. Even where their range was not actually converted to agriculture, the rhinos were deprived of food and cover, and became easier targets for poachers. It was a vicious cycle: as the rhinos became scarcer, their individual value increased and, with it, the poaching pressure.

The rhino population was so re-

duced by the early 1900's that the British authorities became alarmed. They declared the animals legally protected and established a series of small sanctuaries and reserves in Assam and Bengal, designed to protect both the last concentrations of the rhinos and some portion of their habitat. By the 1930's, rhino products had become so valuable that poaching became an organized business, and troops were called out to fight the poachers and protect the rhinos. During World War II, poaching slackened off.

Following the war, and especially after Indian independence, there was a renewed interest in wildlife conservation in Assam, sparked by two men: E. P. Gee, a British tea planter long interested in the rhinos, and Assam's Conservator of Forests, P. D. Stracey, under whose jurisdiction fell such wildlife matters.

The rhino population in India today has increased to some four hundred animals, all but a dozen or so living in the protection of eight reserves in Assam and Bengal. Another four to five hundred animals may survive in the Rapti Valley. However, recent information from the Inter-

national Union for Conservation indicates that the latter population may have been virtually wiped out by poachers within the last year.

The Indian rhinos in India, on the other hand, are well protected for the time being against either poaching or threat to their habitat. Some two hundred fifty are in the magnificent Kaziranga Wildlife Sanctuary, in Assam, a wide expanse of elephant grass plain, cut by waterways and low, wooded ridges. Here the government provides facilities for visitors who wish to stay and view the rhinos from elephant-back, and there is a staff of about fifty persons to maintain and protect the area. The rhino population here appears to be increasing and the government has permitted a very few animals to be caught, under close supervision, for shipment to approved foreign zoos.

PROBABLY the greatest immediate threat to the Indian rhinos' future is the constant pressure to open the reserves so that their fishing, grazing, and agricultural possibilities may be exploited. Fishing and grazing are both allowed in the Sanctuary on a limited basis, making the threat of disease transmittible from domestic stock, a very constant menace to the rhinos and other wildlife. However, in 1956, as a consequence of the effective protection provided by the Indian Government, the Survival Service of the International Union for Conservation removed the great Indian rhinoceros from its list of "Fossils of Tomorrow"—a roster of the world's most critically threatened species—and placed the rhinos instead on its provisional list.

Although, at present, those rhinos in the Indian reserves are holding their own or increasing, their future is still far from assured. The greatest immediate need is a sound knowledge of the animal's ecology—its habitat web. Without such information on which to base effective management, no animal's survival can be assured. Unfortunately, the Indian rhino has yet to be the subject of intensive, scientific investigation: we know little more now about its ecology than did Marco Polo in 1298.

STOCKADE, left, is rhino's home until it has adjusted to state of captivity.





WITHIN A WEEK of capture, the once-fierce rhinoceros has accepted its fate, and will take proffered food from hands

of its keepers. After a few more weeks in the stockade, the animal is considered ready for shipment to some foreign zoo.