Odd-toed Ungulates

VIVEK MENON

A Greater One-horned Rhinoceros calf follows on the heels of the mother in burnt grass, Kaziranga NP, Assam

INDIAN ODD-TOED UNGULATES AT A GLANCE

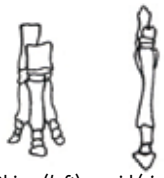
NUMBER OF SPECIES	**3**
LARGEST	Rhino
SMALLEST	Khur
MOST COMMON	Kiang
MOST ENDANGERED	Rhino
Activity	
Rhinos	✹
Equids	✹

Niche Occupancy

Rhinoceroses, Equids

INDIAN MAMMALS

Perissodactyl Toe Forms



Rhino (*left*), equid (*right*)

Rhinoceros Species

Black Rhinoceros

White Rhinoceros

Sumatran Rhinoceros

Javan Rhinoceros

Greater One-horned Rhinoceros

WHAT IS AN UNGULATE?

In common parlance, an ungulate is a hoofed mammal. The hoof is a modified nail. Ungulates are grouped into Artiodactyl and Perissodactyl orders, based on whether they are even-toed or odd-toed. Recent studies group elephants, hyraxes and sea cows as Paenungulates,[1] close relatives of the hoofed mammals. However, this relationship is genetic and not based on morphology. Wild Artiodactyls in India comprise mountain goats and sheep, wild cattle, deer and chevrotains, antelopes and wild pigs.

WHAT IS A PERISSODACTYL?

Eighteen species of ungulates (equids, rhinos and tapirs), all of which have an odd number of toes and most of which are endangered, are known as Perissodactyls. Of those found in India, equids have a single toe and rhinos have three. Rhinoceroses are mega-herbivores, with one or two sharp conical horns at the tip of the nose. There are five species of rhinoceros in the world, of which two are African and three Asian.

WHAT IS AN EQUID?

Equids are specialized grazers, and comprise horses, zebras and asses. They originated in North America 55 million years ago and colonized Asia around 1.8 million years ago.[2] They are odd-toed ungulates with a single toe enclosed in a hoof. They put their entire weight on the central toe, which gives them a springy gait and, therefore, speed in flight. They are non-ruminants with long incisors and specialized molars.[3] All equids are social animals that live in large herds, and gallop over open stretches with a grace and power that is unique to the family. India has both the Tibetan Wild Ass or Kiang, and the Indian Wild Ass or Khur as wild equids.

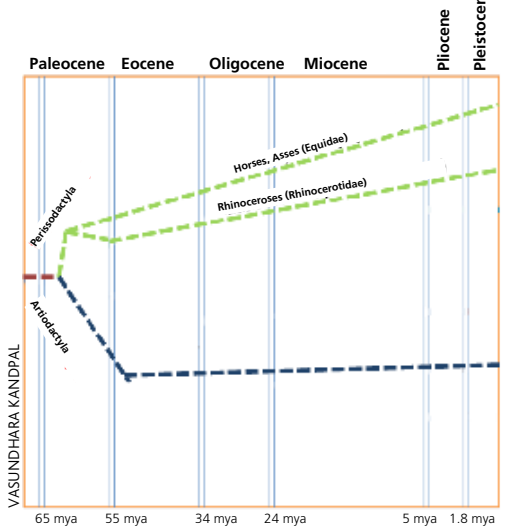
Despite the fact that they are closely related, the domestic horse (*Equus feral caballus*), the wild horse *(E.f. przewalski*), the domestic donkey (*E. asinus asinus*), the wild asses (*E. hemionus, E. africanus* and *E. kiang*) and the zebras (*E. zebra, E. quagga* and *E. grevyii*) are all marginally different from one another. Wild asses are larger than the domestic donkey but smaller than horses. Their ears are longer than those of donkeys and horses. Both wild and domestic asses have an erect mane of short hair and a paintbrush tip to the tail, while horses have a flowing, silky mane and tail. Horses have a horny pad on each leg, known as a 'chestnut', but asses have them only on the forelegs. Wild asses are plain coloured except for their caudal stripe, while domestic asses have horizontal stripes on the shoulder and sometimes on the legs. Other than their characteristic black and white stripes, zebras can be told apart from donkeys in being slightly larger, always having a black tip to their noses and having more rounded ears. They share with donkeys the hair on the tail (only on the tip) and mane (short and bristly), characteristics that set them apart from horses.

An even-toed Wild Buffalo and an odd-toed rhinoceros at a waterhole, Kaziranga, Assam

ALL PHOTOGRAPHS: VIVEK MENON

Przewalski's Horse, extralimital

Burchell's Zebra, extralimital



Evolutionary tree of Indian odd-toed ungulates
(Adapted from Macdonald D., 2001)

Domestic pony and donkey, extralimital

Tibetan Wild Ass (Kiang), Ladakh, Jammu & Kashmir

INDIAN MAMMALS

Perissodactyl Hooves and Tracks

Khur track

Rhinoceros hoof

Hind-gut fermenters

Perissodactyl Skulls

Equid

Rhino

LOCOMOTION

Both equids are exceptionally swift runners and have been clocked at touching 60 km an hour and maintaining 45–50 km an hour for over 5 km.[4] A horny cushion covering the heel acts as a shock absorber in the hoof.[5] The legs are long and slender and the body streamlined for speed. The rhino normally ambles but is no sloucher either if it comes to aggression or threat; it can clock up to 55 km an hour for shorter distances. Perissodactyls do not migrate in the traditional sense of the term, but the Kiang seasonally use hills, valleys and flat pastures with different intensities across seasons. At times, there is an altitudinal movement daily, with the animals going up during the warm part of the day and coming down into the valleys in the evenings.[6]

DIET AND FORAGING

Equids are predominantly grazers and hind-gut fermenters adapted to survive on coarse food. They feed on a wide variety of grasses and forbes. The Kiang feeds on grasses and sedges.[7] *Stipa* forms between 65 per cent of its food in summers and 90 per cent in winters.[8] *Kobresia, Carex, Poa* and *Elymus* species are also eaten by Kiang in significant quantities. Khur are also predominantly grazers when grass is available and prefer *Cyperus capillaries, Andropogon* ssp, *Dichanthium annulatum, Aristida alscansiosis* and *Iseilema prostratum*.[9] They turn browsers in drier times and are known to eat seed pods of *Prosopis juliflora* and fruits of *Salvadora persica*, using their hooves to break root systems to get at forbes. More recently, they have turned to raiding crops,[10] especially sorghum *(Pennisetum typhoides)*, wheat and green cotton pods.

Rhinos both graze and browse, though they are preferentially grazers in grasslands with ample grass. They can browse on land and on aquatic vegetation, using their prehensile lip.

VOCALIZATION AND COMMUNICATION

Rhinos have up to 10 different forms of vocalizations, but the snort preceding a charge is what most people hear. They are known to snort (approach warning), honk (in face-to-face encounters between rhinos, normally the subordinate honks), bleat (submission), roar (intense aggression), squeak-pant (courtship chases) and moo-grunt (maternal contact call).[11] They also communicate with scents from foot glands and dung toilets, which are regularly inspected by other rhinos. Rhinos often walk with their nose to the ground, thus scent tracking other individuals. Wild asses, on the other hand, are by and large silent animals, although a loud bray at times of breeding or territorial fighting is known. Dominant stallions have more guttural vocalizations than subordinates, who squeal.[12] Both wild asses drag their feet over stretches of mud to leave characteristic zigzag territorial markings.[13]

PRAVEEN MOHANDAS

Khur galloping at high speed: an equid characteristic, Rann of Kutch, Gujarat

VIVEK MENON

Rhinos are good swimmers, even breasting the Brahmaputra River, Assam

NIRAV BHATT

Khur eats what little xerophytic and saline vegetation the Rann has to offer, Kutch, Gujarat

VIVEK MENON

A rhino grazes in the alluvial grasslands, Kaziranga NP, Assam

VIVEK MENON

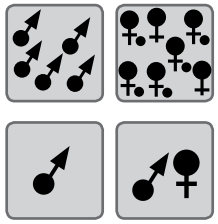
Kiang graze in high-altitude trans-Himalayan pastures, Ladakh, Jammu & Kashmir

MAYUKH CHATTERJEE

VASUNDHARA KANDPAL (ADAPTED FROM MACDONALD D., 2001)

INDIAN MAMMALS

Social Organization of Equids



Wild Ass social grouping

Rhino social grouping

VASUNDHARA KANDPAL (ADAPTED FROM MACDONALD D., 2001)

SOCIAL ORGANIZATION

Equids are more social than rhinos, which are naturally solitary. The former exhibit two different forms of social living. Horses and zebras form permanent herds, but wild asses live in fission–fusion societies.

The Kiang, for example, form groups with an average of six or seven animals but rarely herd permanently. Large herd sizes of up to 48 animals have been seen in India, while on the Tibetan Plateau, up to 500 animals have been recorded in one herd.[14] Their temporary groupings are largely mother-and-foal based, or of young bachelor males. Stallions are largely solitary and extremely territorial. The Khur have a well-structured harem, family band and bachelors.[15]

The rhino on the other hand is a loner except occasionally, when young males join up together, or when the female is with her calf for nearly four years.

REPRODUCTIVE STRATEGIES

The Kiang breeds from June to September, although July and August are possibly the peak. During this time, the females form larger herds, and females of the same age or same reproductive stage may form associated herds to attract the solitary and territorial males. Both asses are sexually mature by two years of age and can breed for at least 15 years in the wild.[16]

The females have a gestation of nearly one year (355 days), so autumn is also the time for foaling, and foals are seen by July. The foals can run at top speeds almost upon birth, and suckle up to a year, at which time they become independent and sexually mature.

The Khur also breed around June to August, which is monsoon in the Rann. Stallions maintain territory all year round, and during breeding season, females move into male territories.

Some females stick to one male's territory while others move between males. When a group of females sticks to one male territory, it appears to be like a 'harem', but unlike langurs, for example, the Khur male rarely defends his females and defends only his land, allowing the females to go between his and his rival's territory.[17]

Female gestation in the Khur is marginally shorter than that of the Kiang (320–330 days).[18] A single foal is born thereafter, which is suckled for eight to 10 months,[19] although the foals can eat grass from a month onwards.[20]

Rhinos are hesitant breeders with the male coming into puberty at five years of age (the time when calves leave their mother) and the female comes into puberty a little later at six. They associate only for mating and the female has a gestation period of over 15 months, producing one young that suckles for four years.

NIRAV BHATT

Khur stallions rear up on their hind legs and bite each other, Rann of Kutch, Gujarat

KALYAN VARMA

Courtship of Khur: biting the neck, Rann of Kutch, Gujarat

VIVEK SINHA

Khur mating, Rann of Kutch, Gujarat

NITA SHAH

A hybrid of a Khur and a donkey, Rann of Kutch, Gujarat

MANOJ DHOLAKIA

A rhino mounts his mate, Kaziranga NP, Assam

SUMANTA KUNDU/WTI

A rhino female with twins, a very rare occurrence, Jaldapara WLS, West Bengal

Useful Contacts for Rhinoceros Conservation

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THREATS AND CONSERVATION

Rhinos are poached primarily for their horn, which in the case of the Indian rhino finds its way into the markets of the Far East for use in Traditional Oriental Medicine. The pharmacopeia of these countries list rhino horn as an anti-pyretic or fever reducer, but it is believed worldwide that it is used as an aphrodisiac. Either way, the rhino is a soft target, with its horn fetching the poacher several years of his impoverished livelihood. The rhino is very predictable in its habits: it moves through the same paths or *dandis* and also visits the same toilets, making it easy for poachers to track.

Most rhinoceros populations in Assam are easily accessible, being surrounded by human population, and having a fairly high density of rhinos. Therefore, rhino protection has become a full-time priority for the forest department of the state, and a large human security system and intelligence is what saves the rhinoceros on the ground.

Domestic livestock are the most serious threat facing wild equids in India. More than 200,000 livestock share the Kiang pastures in Ladakh, [21] Jammu & Kashmir, and 2,500 yaks and sheep compete for drinking water in the small habitat in Sikkim.[22] Apart from this, livestock are a key carrier of diseases that can devastate wild equid populations.

Disease is a key threat to both equids. The Khur population actually crashed from between 3,000–5,000 animals in the 1950s to around 400 in 1970 due to an outbreak of Sura, a parasitic trypanosome disease. This parasite is spread through a midge (*Culicoides* spp).[23] Land-use patterns catering to cash crops and water availability have also increased conflict with local farmers.

Assam and West Bengal conserve rhinos in the wild, especially through protection and habitat modification (burning mature grass so that fresh shoots come up, or dredging water bodies as rhino wallows). In 1984, the Union and the state governments of Uttar Pradesh and Assam reintroduced five rhinos from Assam to Dudhwa NP in Uttar Pradesh.[24] This project has had limited success, although the number of rhinos had gone up to 34 by 2013.

In 2006, the WTI and Assam Forest Department restocked Manas NP by translocating three hand-raised orphaned calves back to the World Heritage Site that had lost most or all of its rhinos in the early 1990s. Four more rhinos have since been moved. Three of the seven rhinos have now given birth in the wild as well, proving this to be a conservation success story. Following this, the Rhino Vision 2020 of the Assam Government, aided by Worldwide Fund for Nature (WWF) and the International Rhino Foundation (IRF), has moved 10 more rhinos to Manas NP from Pabitora WLS, in a wild-to-wild move. Local groups in Assam, such as Aaranyak, have also been active in protecting rhinos. In Manas, several community-based organizations, including Manas Maozigendri, have pioneered community protection of rhinos.

VIVEK MENON

Kiang carcass, Changthang WLS, Ladakh

VIVEK MENON

Electric high-tension lines, a threat to the rhinoceros, Pabitora WLS, Assam

ANJAN TALUKDAR/WTI

Rhino with horn cut off, outside Kaziranga NP, Assam

NIRAV BHATT

Khur in a cotton field on the edge of the Rann of Kutch, Gujarat; conflict is a serious threat to the species

VIVEK MENON

Orphaned rhino calf being bottle-fed at CWRC, Kaziranga NP, Assam

COMMON NAME: GREATER ONE-HORNED RHINOCEROS

Family: Rhinocerotidae **Latin Name:** *Rhinoceros unicornis* Linnaeus,1758[41] **Local Names:** *Gaanda* (Bodo), *Gainda* (Hindi), *Gaur* (Assamese), *Gondar* (Bengali) **Best Seen At:** Kaziranga NP, Assam **IUCN/WPA/Indian Status:** Vulnerable/ I/ Locally common **Social Unit:** Solitary, in pairs during breeding, and loosely associated feeding groups of females and subadult males at good grazing grounds **Size:** HBL: 335–346 cm; HAS: 175–200 cm; Wt: 2,000 kg (male);[42] 1,500 kg (female)

DESCRIPTION: The second largest mammal in India after the elephant, the Greater One-horned Rhinoceros is best recognized by its large bulk and a single horn (a compacted mass of hair-like substance called keratin) seemingly balanced on its nose. Two large folds of skin across its flanks and tubercles on its rear, which look like rivets on the skin, give it an armour-plated look and distinguish it from all the other four species of rhino.[43]

The actual colour of the Greater One-horned Rhinoceros's skin is a deep slate-grey, but it looks ashy when encrusted with alluvial mud, or ink-black when wet. The skin is almost hairless. The hair is restricted to the tip of its small, naked tail, its large and tubular ears tips, and eyelashes over small and beady eyes. The hooves are large and three-toed.

Males are slightly larger and have thicker neck musculature, marginally longer horns and lower mandibular incisors as compared to females. Horns average 25 cm in males and 24 cm in females while incisors average 5–9 cm in males and 4–5 cm in females.[44] The horn weighs an average of 750 g.[45] The male genitalia are also visible at times.

Newborns are pinkish-grey at birth and turn into adult colouration in a few months. The horn starts to grow by a year and a half.

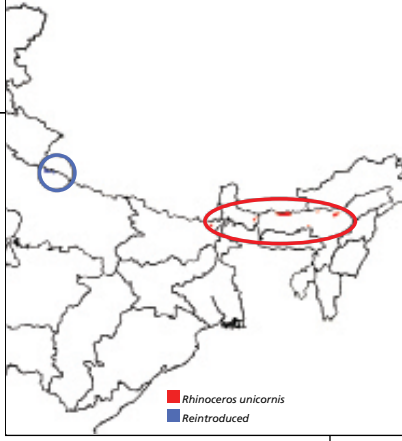
BEHAVIOUR: A creature of habit, the rhino regularly follows the same walking paths or *dandis* when foraging. It also uses the same spot to defecate, forming large 'toilets'. This behaviour makes it vulnerable to poachers who wait for it at pre-determined locations. Indian Rhinoceroses do not use their horn to gore victims, but use their sharp teeth to bite off chunks of flesh instead. The teeth are also used when fighting among themselves.

DISTRIBUTION: Distributed as nine distinct populations spread in the Terai and Bhabhar tracts of northern India, and the Brahmaputra River basin in the North–East. It occurs in Assam (Kaziranga, Orang, Pabitora, Manas and Laokhawa-Burachapori), West Bengal (Jaldapara and Gorumara), Bihar (Valmiki) and Uttar Pradesh (Dudhwa). The last is a reintroduced population and the one in Bihar is a recent crossover from the Chitwan–Parsa ecosystem of Nepal. The population in Manas is a restocked population.

HABITAT: Tall alluvial grasslands and riverine forest–grassland mosaics (which are dominated by *Saccharum spontaneum, Narenga porphyracorma* and *Themeda arundinacea*) with swampy patches in the Gangetic and Brahmaputra river systems in the foothills of the Himalayas.

Rhino facing away, Jaldapara WLS, West Bengal

Adult *rhinoceros unicornis* in a swamp near a grassland, Kaziranga NP, Assam



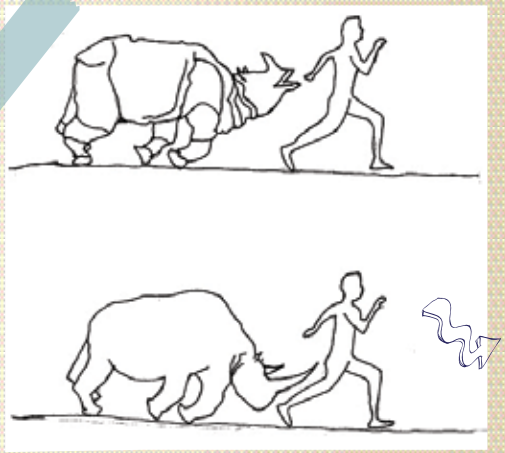
A rhino defecates in a dung pile, Kaziranga NP, Assam

Newborn rhino, a few days old, CWRC, Kaziranga NP, Assam

Horn emerging in calf more than a year and a half old, CWRC, Kaziranga NP, Assam

Field notes: Tip-toeing around the World

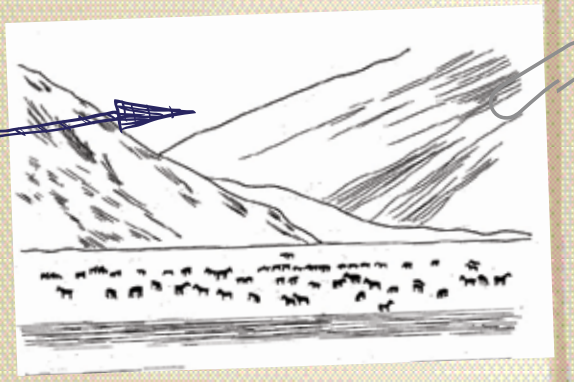
Having been a part of capture and translocation operations of both the Black Rhinoceros in Kenya and the Greater One-horned Rhinoceros in India, I have learnt one important behavioural difference between the two. The African rhinos butt with their horn, and ours bite with their powerful incisors!

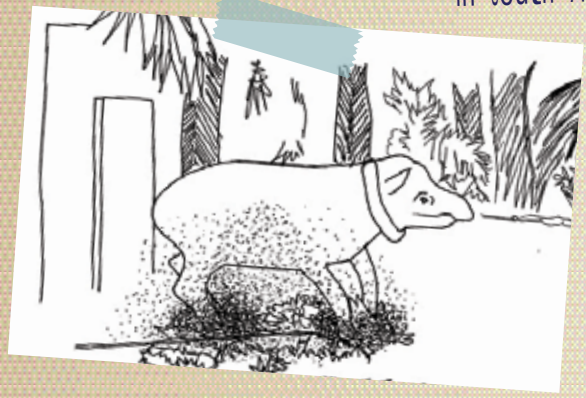


Rhinos are one of the most dangerous animals in India to come across on foot. Beware, especially if a mother that you have been careful to avoid is separated from its calf, which you have not seen, in the tall elephant grass of rhino habitat. Rhinos can clock 55 km an hour when they chase you.

The Changthang, Tibet's northern and western plateau, extending into south-eastern Ladakh, is the Indian Serengeti and the Kiang is our equivalent of the zebra. Grazing in large herds amidst mountain goat and sheep, watching this high-altitude equid run through grass is an unparalleled delight.

I have had the good luck of seeing 60 per cent of Perissodactyls in the wild: Three of the world's five rhinoceros species, all three zebras, two of the three wild asses and one of four tapirs. The most memorable was the Brazilian Tapir that I helped radio-collar in the Pantanal Conservation Complex in South America. For my humble part in the operations, the team named the individual after me, a most confused 'Tapirus vivek'!





The horn of the rhinoceros is a densely packed bunch of hair loosely attached to its nasal bone. Keeping it on the rhinoceros and outside the illegal rhino-horn trade has taken up as many as two decades of my anti-poaching and anti-smuggling work.

VASUNDHARA KANDPAL