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Social and Reproductive Behaviour of Great Indian One-horned Rhino, *Rhinoceros unicornis* in Dudhwa National Park, U.P., India

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Abstract

Present work deals with the study of social and reproductive behaviour of the great Indian one-horned rhino (*Rhinoceros unicornis* L., 1758) in Dudhwa National Park, Uttar Pradesh (India). Indian rhinos are basically solitary creatures, but do not resent one another's company. Occasionally, they form temporary associations consisting of either all female or all male in a large lake or at grazing areas. The only strong social bond is the mother-calf unit, which may last for up to 2-3 years. Indian rhinos are reluctant breeders i.e. the desire of courtship and mating behaviour in the male and female do not synchronize all time. Like female, male also undergoes a period of heat and these periods must coincide before mating takes place. Knowledge about the social and reproductive behaviour is important strategic information that should be incorporated into the conservation and management plan for the threatened Indian one-horned rhinos. The present study, conducted between January (2011) to December (2012), provides vital information to strengthen the available data about behaviour of Indian rhinos.

Key-Words: *Rhinoceros unicornis*, Dudhwa, Social and Reproductive Behaviour, Tarai, Rhino Rehabilitated Area

Introduction

The great Indian one-horned rhinos once used to roam freely in tarai belt of Uttar Pradesh including Dudhwa forests, but due to over-hunting and destruction of habitat in the last couple of centuries, however, finished off them in much of this range. Record shows that the last rhino, in Uttar Pradesh, was shot in Pilibhit district in proximity of the now Dudhwa National Park (DNP) in 1878. In 1979, Species Survival Commission of IUCN recommended to establish (rehabilitate) a viable breeding population of Indian rhinos in their former distribution range. Of the various areas surveyed in 1980/81 by a panel of experts, DNP was found to be the most suitable alternate habitat (Schenkel, 1983). The rhino rehabilitation project was began in 1984-85 with a seed population of 7 Rhinos (2 males and 5 females), which were translocated from Pabitora Wildlife Sanctuary, Assam and Royal Chitwan National Park, Nepal (Sale and Singh, 1987). The animals from two different areas have adopted new habitat well. The Project has now completed its 29 years and rhino's number has grown to 34, comprised of 19 adult cows, 8 bulls and 7 calves.

The social and reproductive behaviour of Indian rhinos have been studied by several workers. Ulrich (1964) studied the social behaviour and social organization in rhinos of Kaziranga National Park (Assam).

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Lahan and Sonwal (1973) and Lahan (1974) gave an account of social behaviour in Indian rhinos. In a detailed study of behavioural ecology of Indian rhinoceros, Laurie (1978) evaluated the food selection and dietary diversity, movements, social behaviour and other behavioural status, population status, age and sex structure by means of direct observation in Royal Chitwan National Park. Several workers (Goddard, 1967; Lang, 1975; Laurie, 1982; Dutta, 1991) have studied the courtship and mating behaviour of Indian rhino. In addition, Buechner and Mackler (1975), Bhattacharya and Goswami (1987) and Bhattacharya (1991) has studied some biological aspect of Indian rhino and also presented reproductive behaviour and mother-calf relationship in captivity. However, very less study on behaviour of rhinos mainly on social and reproductive behaviour has been carried out in DNP. Therefore, considering the above fact, author has carried out study on social and reproductive behaviour of Indian rhinos in DNP.

Study Area and Methods

Dudhwa National Park is situated in the Lakhimpur-Kheri district of Uttar Pradesh and lies between $28^0$18'N and $28^0$42'N latitudes and $80^0$28'E and $80^0$57'E longitudes. The Park is 490 sq km in extent with a peripheral buffer zone of 124 sq km. The Mohana and Suheli rivers constitute respectively the northern and the southern boundaries. An area of 28.11 sq km, including whole Kakraha block and a part of Chhota

Palia block, constitutes the Rhino Rehabilitated Area (RRA) and enclosed by a power fence (Fig. 1). The RRA comprises 67% grasslands, 22% woodlands (Sal forest) and 11% water bodies including fringes and riparian. The grasslands are interspersed with trees like *Accacia catechu*, *Syzygium cumini*, *Dalbargia sissoo* etc. The tall grasses are mainly *Sclerostachya fusca*, *Saccharum munja*, *Themeda arundinacea*, *Apluda mutica* etc. and short grasses comprise such as *Imperata cylindrical*, *Saccharum spontaneum*, *Vetiveria zizanioides* etc. the aquatic habitats contain different hydrophytes, while marshy lands are generally covered by the grasses like *Typha augustata*, *Phragmites karka*, *Bothriocloa* sp., *Cynodon dactylon* etc. The climate of Park is of monsoon type. In winter season (mid-October to mid-March), January is the coolest month and in summer season (mid March to mid June), May and June are the hottest months. The average annual rainfall is about 150 cm, 90% of which is occupied from June to September.

The observations were carried out by means of elephant riding, motorcycle, watchtowers and temporary machans (observation platforms) on trees at various locations. Rhinos were also sighted on foot. Binoculars (9×40) and telescope (22×60) were used to observed behaviour of rhinos from long distance. Most adult and sub-adult rhinos were identified individually by using the scheme of Laurie (1978) i.e. variations in horn shape and size, collar and skin folds, arrangement of tubercles, scars, ear nicks and tail cuts etc. However, the old individuals bear name such as Bankey and Nakul the males, and Pabitri, Rapti, Himrani and Swayambara the females. Some of the observations were also discussed with Mahouts and Forest Guards who are deputed for the monitoring of rhinos in RRA.

Observations

I. Social Behaviour

Indian rhinoceroses are not very social animal. In RRA, however, the temporary associations of rhinos were observed in large lakes, wallows and grazing grounds when they rested or fed close to each other but moved independently. There was no stable (long-lived) group except mother-calf pairs that were the commonest type of groups observed in RRA. Even adult male and female avoid meeting each other except during mating period.

Following types of associations were observed among the rhinos in RRA, Dudhwa National Park.

a) Association of Mother and Calf

Mother-calf association is the only strong social bond exhibited by rhinos, which may last up to about 2-3 years. Just after the birth, some kind of reciprocal imprinting occurs between mother and calf (Fig. 2). They become familiar to each other and from then onwards form an intimate social unit. With time the calf is guided and protected by the mother.

Mother rejects the old calf before she gives birth to the next offspring. The old calf may later re-join the mother when the new calf is several months old. In this way matriarchal community is formed which are, however, not very stable.

b) Association of Bull and Cow

Bull and cow form a long-term association during mating period only, but sometimes a bull may be found with a cow for a short period or even whole day, even when she is not in heat. It was observed that bull becomes equally aggressive during the pre-mating phase. Fights were also observed between bull and cow especially in the context of pre-mating but these were never serious.

c) Association between Bulls

Intolerance between bulls is somewhat more frequent but also not a predominant feature of rhino sociology. Mostly the bulls do not associate with one another or show marked tension when they meet. Hostile encounters between males are more frequent, but often bulls deliberately avoid meeting each other. Breeding males are generally territorial and form territory by defecation and/or urine scent markings and compete for estrous females.

II. Reproductive Behaviour

Observations indicate that the desire of courtship and mating behaviour in Indian rhinos do not synchronize all time. Male also undergoes a period of heat as does the females, and these periods must coincide before mating takes place. Males come in to heat when they are in rut. In females the period of estrous cycle is about 46-48 days as recorded in Zoo. In RRA, rhinos prefer to breed between the months of March to June and most of the calves were born between the months of July to October. Three phases of reproductive behaviour have been observed viz., pre-mating, mating and post-mating behaviour.

a) Pre-mating (Courtship) Behaviour

In rhinos the courtship is a complex behaviour, which takes place before the mating and a social and sexual relation is established between the partners. Such relations between a cow and bull last for several days and even longer. The cow on heat utters typical rutting calls and squirts urine at short intervals to attract the bulls. These mating calls are low-pitched, often associated with deep sigh and appeared to be of groaning sound devoid of any nasal exhalations. The mating calls observed in RRA were short-lived but occurred in quite intervals; at least 10-20 calls were counted in each bout. The frequent flickering of vocal

cords was also associated with each call. In the beginning of courtship, the cow generally rushes at bull and even chases him. Normally the bull chases the cow at a trot or a gallop like horse. From time to time the animal faces each other to fight with horn and teeth.

b) Mating Behaviour

After a successful courtship display, the cow become submissive and agrees for mating. The cow stand in front of bull with her hindquarters turned in his direction and even steps backward towards him. The bull put his forelegs on her rump and mounts her. Mating itself lasts for 20 to 75 minutes. After completion of mating the male dismounted immediately and both the partners disperse from the mating site. No further association was observed after completion of mating. Dragging behaviour was also observed in copulating male and female rhinos, in which female carried the male on her back to a distance more than 60 meters.

Indian rhino has no definite breeding season. Mating among rhinos in RRA was observed throughout the year and more in numbers during March, April, May and June. Mostly the mating behaviour takes place in dark of the night, which indicates that rhinos are how secretive in their mating behaviour.

c) Post-mating Behaviour

Pregnancy in a female rhino is difficult to detect in her natural habitat. Even in Zoo condition it is only possible just two to three months before delivery, which is obvious through development of teats. To observe teats in the natural habitat is very difficult because of thick wild growth and nature of the animal always maintains a safe distance from observer.

The gestation period is about 480 days recorded in the Zoo rhinos. A fully developed calf is about 120 cm long and 60-70 kg by weight at the time of birth. Alike other ungulates, the newly born calf become able to rise within an hour of birth. Then it searches the nipples in the angle between legs and body of its mother and suckles showing innate behaviour. Very soon both mother and newly born calf become familiar with each other through imprinting. Calf suckled every half an hour or so, which is typically continues until the calf is of 2 years old or the mother conceives again. About 2.6 years old calf is independent and 3 to 4 years old females become sexually mature. Normally 4.6 to 5 years old cows give birth to the calf.

Results and Discussion

Indian rhino is basically a solitary creature and do not form a permanent association except mother-calf unit, which may last up to about 2-3 years. Occasionally, 3 or more rhinos make an association of short duration at wallows or grazing grounds where they often feed or rest together but move independently of each other (Laurie et. al. 1983). The male and female are seen together only during mating season. In RRA, only 17% of sightings of rhinos were groups of other than mother-calf units. Only 9 groups consisted of more than three individuals and the most common type of group was comprised of 2 or 3 sub-adults, usually sub-adult males, which had recently left their mothers. The largest group of rhino recorded in RRA was consisted of 5 sub-adults.

Courtship and mating behaviour can occur at any time of the day or night. Bulls test female's reproductive status by testing her urine, which is then followed by a pronounced curling of the upper lip, known as 'flehmen response' (Goddard, 1967; Laurie, 1982). Until the cow is receptive, she may repeatedly drive the male away with mock charges and other defensive behaviour. Loud whistling by Indian Rhinos announces reproductive condition and location, which typically occurs 6-10 hours prior to courtship or breeding activity. The whistling attracts bulls that respond with pre-copulative behaviour, such as prolonged chases of 1-2 km. Such behaviour ensures that female ultimately mate with the strongest (most dominant) male in the vicinity (Laurie, 1982). Females may become aggressive too, especially during courtship chases in captivity, which may result in scraps, cuts or deeper wounds (Laurie, 1982; Dutta, 1991). When mounting is successful, 4-5 thrusts made in rapid succession indicate ejaculation. In some cases, ejaculations have occurred at the rate of one per minute (Lang, 1975).

In RRA, the peak mating period of rhinos was observed between the months of March to June. Similarly, Kakati and Rajkonwar (1972) have observed that they prefer to breed in the months of April to June in Kaziranga National Park, Assam. This difference may be due to abiotic factors as it was found in other mammals. The highest calving in RRA was recorded between the months of July to October.

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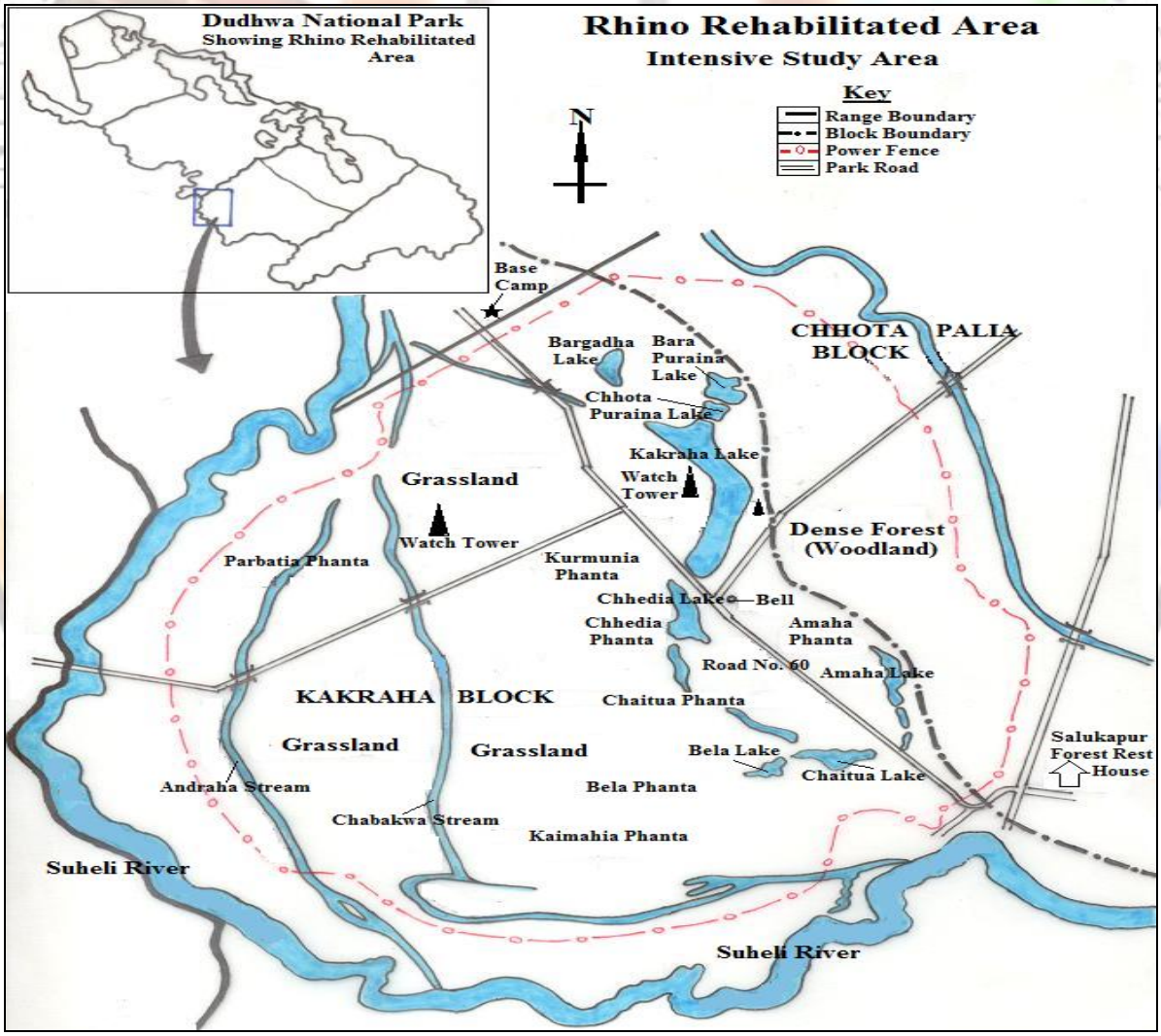

Fig. 1: Rhino Rehabilitated Area in Dudhwa National Park

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Fig. 2: A Cow with 2.6 year old calf in Grassland

Fig. 3: One-month-old calf in RRA