

## THE ECOLOGY AND BEHAVIOUR OF THE GREATER ONE-HORNED RHINOCEROS

Andrew Laurie has written his Ph. D. thesis on "The Ecology and Behaviour of the Greater One-Horned Rhinoceros (*Rhinoceros unicornis*). It is the culmination of three years field work principally in the Chitawan Valley, Nepal and the Brahmaputra Valley, Assam, India.

This is the first detailed field study to be made on this species. Below is a summary of the thesis.

A field study of the greater one-horned rhinoceros was carried out in the Royal Chitawan National Park, Nepal. The study spanned 3 ½ years, during which comparative observations were made in the Kaziranga National Park, Assam and other localities in Assam and West Bengal.

The past and present distribution of the rhinos are discussed and the study areas are described with reference to their climate, vegetation, fauna and history of human occupation and influence. The decline in numbers of rhinos has been mainly due to destruction of their riverine grassland habitat and poaching for the horn.

Observations in the tall grasslands of Chitawan were made on foot, from elephant back or from tree platforms. The size, sex and age structure of the Chitawan rhino population were determined by individually identifying over 200 rhinos in two main study areas. Differences in horn shapes and nicks in ears were among the features used for individual recognition. There were differences between the two study areas in population density, which were related to habitat differences. The overall adult sex ratio was 62 males to 100 females and there were fewest males in the areas of high population density. Sex ratio at birth was near parity but mortality of male calves was high and 17% of all recorded deaths were the result of fighting among males. Intercalving intervals averaged 3 ½ years and the population was increasing at a rate of about 2% per year.

Rhinos fed mainly on tall grasses such as *Saccharum spontaneum* and short grasses such as *Cynodon dactylon*. They also browsed on a wide variety of shrubs and trees and fed extensively on aquatic plants and agricultural crops. A time sampling method was used to determine food preferences in different habitats and seasons. Transects were walked to determine food availability and it was shown that the main variation in diet was the result of seasonal variations in availability of food types and consequent movement of rhinos between habitat types. Seasonal movements of identified individuals were shown to be

related to food availability.

Adult males were mainly solitary. Adult females were normally accompanied by a single offspring and occasionally by an adolescent. Adolescents were either solitary or in temporary groups of up to nine.

Breeding males occupied mutually exclusive home ranges or, in areas of highest population density, shared a common home range with one or more other breeding males. Various visual and olfactory displays were used by breeding males to advertise their presence. Fights took place between resident and intruding breeding males but adult males which did not display, were tolerated. Adolescent males were more often attacked by adult males when alone than when in groups; they tended to adopt the home range of the resident breeding male. Adult females occupied overlapping home ranges larger than those of adult males and were more often accompanied by adolescent females than adolescent males. There was more aggression between adult males in the areas of higher population density and this corresponded to a longer average intercalving interval.

Interspecific relationships are described and the rhino's part in the ecological system of Chitawan discussed. The results of the study in Chitawan are compared with the results of shorter study periods in Kaziranga. The evolutionary and adaptive significance of the findings are discussed and the greater one-horned rhinoceros is compared with the other four species of rhinoceros.

The implications for conservation are discussed. The main threats to the rhinos' survival are habitat loss due to flooding and erosion, agricultural encroachment and the spread of certain exotic plants. Poaching is well controlled at present. As 85% of the 1,100 rhinos which remain are restricted to 500 km<sup>2</sup> of suitable habitat in two National Parks there is a danger of overcrowding, facilitation of disease transfer and possible increase in intraspecific fighting. The possibility of reintroductions of rhinos to other areas is discussed.

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