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The conservation status of the black rhinoceros (*Diceros bicornis*, L.) in the Ngorongoro Crater, Tanzania

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Summary

A study on the conservation status of the black rhinoceros (*Diceros bicornis*, L.) in the Ngorongoro Crater, Tanzania was undertaken in order to investigate recent allegations that this species is fast disappearing in the area. Comparison of census data on rhinos were made from 1958 to 1978 during which time there has been a notable steady decline in the mean population density mainly due to increased poaching pressure. Other factors that may have caused this fall are discussed. Urgent management measures to conserve the rhino population in the Ngorongoro Crater and the surrounding areas are recommended.

Résumé

Une étude sur l'état de la conservation des rhinocéros (*Diceros bicornis*, L.) dans le Cratère du Ngorongoro (Tanzanie) fut entreprise dans le but de vérifier de récentes affirmations concernant la disparition rapide de cette espèce dans la région. La comparaison de données de recensements de rhinos entre 1958 et 1978 fut faite; on constate durant cette période un manifeste et régulier déclin de la densité de population moyenne, attribuée principalement à l'augmentation de la pression de braconnage. D'autres facteurs ayant pu causer ce déclin sont discutés. Des mesures urgentes d'intervention pur conserver la population de rhinos dans le cratère du Ngorongoro et les régions périphériques sont recommandées.

Introduction

In the recent past there has been growing concern both nationally and internationally over the conservation status of the black rhinoceros (*Diceros bicornis*, L.) in the Ngorongoro Conservation Area Authority, Tanzania. The mounting allegations that the Ngorongoro rhinos were disappearing prompted the present study. The alarm about poaching was sounded in the news media as early as 1960 (Fosbrooke, 1972) and this initiated antipoaching measures in the area. Since that time no similar alarm was sounded until 1978.

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Although literature on many aspects of Ngorongoro rhinos is voluminous, very little has been published on their census data. Grzimek & Grzimek (1960) estimated the rhino population to be nineteen while other workers (Turner & Watson, 1964) carried out an aerial census in which they estimated twenty-seven rhinos. Goddard (1966, 1967) reported that seventy-eight rhinos use the Ngorongoro Crater as their habitat while Klingel & Klingel (1966) recorded sixty-one. However, the Ngorongoro Conservation Unit (N.C.U.) report (1966) puts the population at 109. Subsequently all the census data on the rhino population in the Crater have been made available in N.C.U. annual reports but none has been published in scientific papers. The population means over the years are given in Fig. 1.

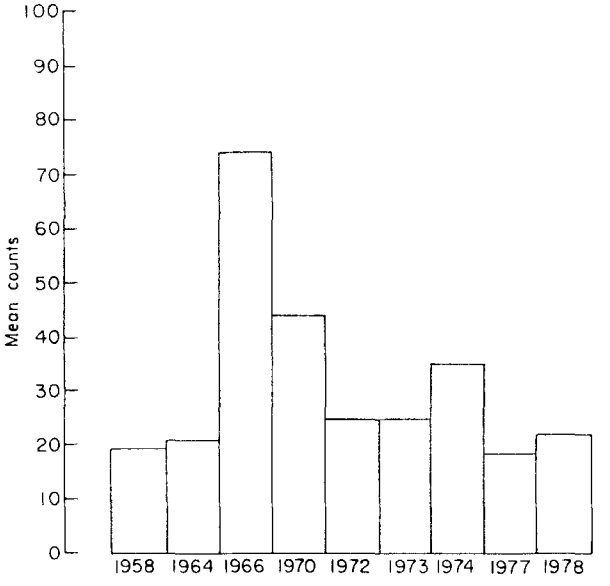

Fig. 1. The mean density of rhinos counted in the Crater from 1958 to 1978.

Study area

The Ngorongoro Crater is a volcanic caldera situated in the Arusha Region of Tanzania approximately 35° 31′ E and 3° 15′ S. The average height of the Crater rim is approximately 2,324 m and its floor 1,707 m above sea level giving a depth of 612 m with a diameter 16 km and 19 km and a floor area of 264 km^2. The Crater, the world's sixth largest and the home of approximately 25,000 herbivore species, is further divided into five easily distinguishable vegetation communities (Herlocker, 1968).

Materials and methods

The count

The animals in the Crater floor are very conspicuous and this therefore justifies a total count which gives a real minimum number of animals to be counted but with the limitation in estimating the number of animals missing during the actual count. In this study, a total ground count was employed in order to enable the present results to be compared with the aerial count carried out by Ecosystems Limited (Nairobi).

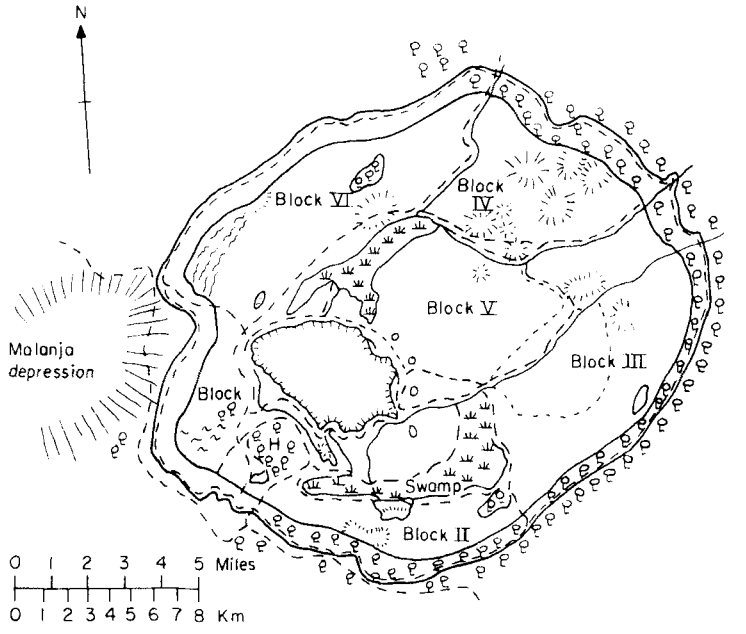

Fig. 2. Ngorongoro Crater showing counting blocks used by Klingel & Klingel (1966), Turner & Watson (1964) and Goddard, 1966, 1967).

The total count was carried out during the day (08.00–17.00 hours) and during the night from May to August, 1978. A Crater map 1 : 158400, compiled from aerial photographs, was used on the count blocks that were used earlier by Turner & Watson (1964); each block being bounded by some easily recognizable physical feature (see Fig. 2). A Land-rover was driven to cover each block adequately and this was facilitated by the absence of thick vegetation cover except in Block number 2 where a different method had to be used. Most of the rhinos were counted visually and photographed simultaneously. Four observers stood at the back of the vehicle and 7 × 35 binoculars were used to determine the sex ratios. The census was replicated four times on four different days during the wet season when the rhinos were presumed to utilize the Crater floor more intensively.

Block 2, the Lerai forest, and the swamp block adjoining it were counted only during early mornings and late evenings during which time the rhinos in these areas were easily spotted.

Identification

The shape of horns, mis-shapen or otherwise deformed ears, prominent scars on the body, the morphology of the tail, sex, and the pattern of the wrinkle contours on the snout provided sufficient details for the recognition of the resident rhinos in the Crater floor. A card system with close-up photographs (taken with the aid of 200 mm Pentax lens) of the head and both sides of the animal, and a detailed description of its characteristics as established by Klingel & Klingel (1966) and Goddard (1966) was used.

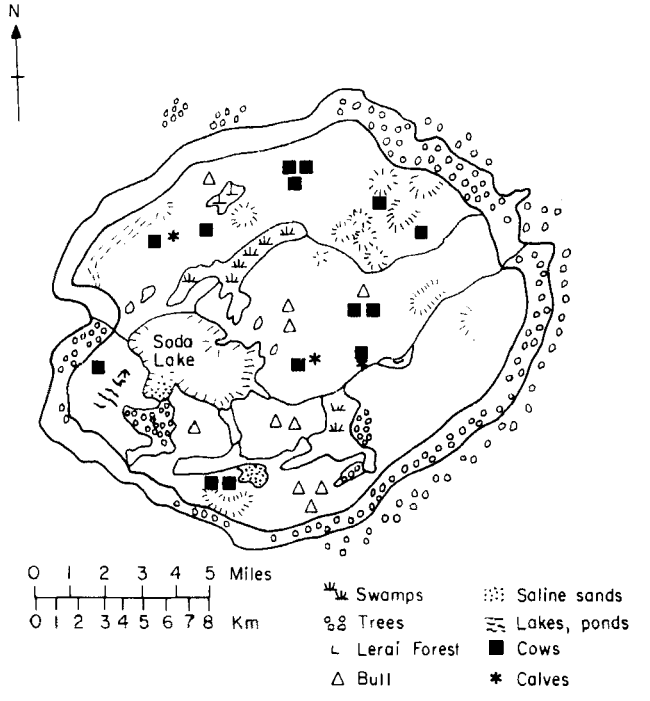

Fig. 3. Rhino distribution in the Crater floor during 1978.

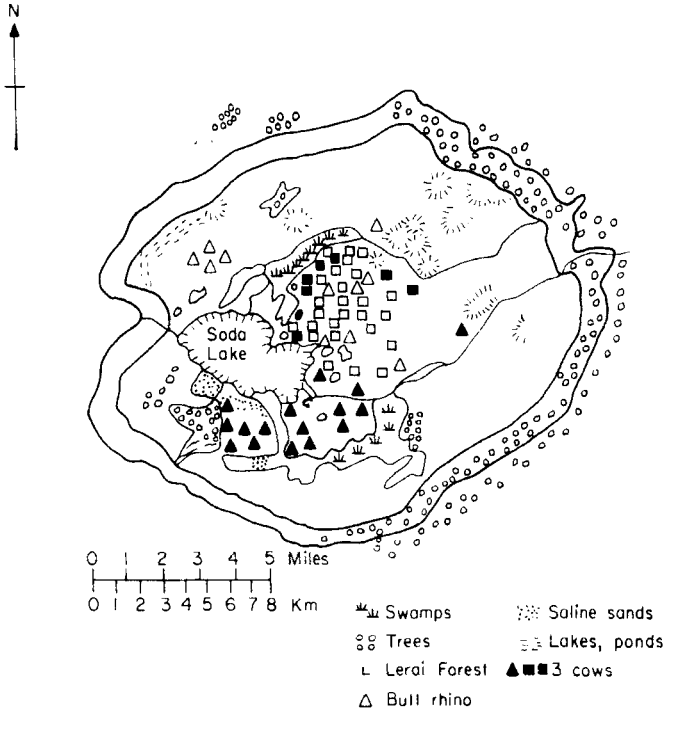

Fig. 4. Klingel & Klingel (1966); rhino distribution in the Crater floor.

Distribution

All identified rhinos were plotted against the blocks covered in order to assess home ranges. The map obtained in this study (Fig. 3) was compared with Fig. 4 of Klingel & Klingel (1966).

Results

Population size and composition

A total of twenty-six rhinos were found to utilize the Crater floor. They included three adult females, four adult males, eleven sub-adult females, six sub-adult males and two calves. Of these, nineteen individuals were recorded every time the census was carried out. This latter group consisted of two adult females, three adult males, nine sub-adult females, three sub-adult males and two calves. Eight of the former group were not recorded every time during the census and they were assumed to utilize the Crater floor part of the time in their home ranges. Prior to this study, Ecosystems Limited Nairobi had carried out an aerial census in the same area during the month of February and they found twenty-one rhinos; whereas twenty-five were recorded in a total count by Ngorongoro Conservation Area Authority in the same month.

Identification

Most of the rhinos which were identified by Goddard (1966), Klingel & Klingel (1966) could not be identified in the present study. These rhinos may either have changed their morphology with the lapse of time or succumbed to natural mortality.

Distribution

The home ranges utilized by the rhinos observed by Klingel & Klingel (1966) are still utilized but the density of the animals has decreased.

Discussion

A significant rise of over 252·5% in the mean density occurred from 1964 to its maximum in 1966. This may be due to the tangible protection measures undertaken at that time. Other reasons for this rise may be an increase in habitat utilization, increased birth rate and immigration. The rhinos' mean density has shown a steady decline of 68·9% from 1966 to date. This decline may be due to a multiplicity of factors.

Food availability can be a serious limiting factor for populations that have reached their optimum densities. However, there has been no recent serious climatic changes which might have affected food and water availability in the Crater floor. Rhino diseases are virtually unknown but since no sudden and spectacular disease outbreaks have been noted, it can be concluded that this factor has not affected the rhino population. Predation by hyaena and lions affects all age classes of rhinos (Ritchie, 1963) but recorded cases are too few to explain this notable decrease in the population mean density. Emigration may be a result of habitat deterioration thus causing the decrease of food, water and other nutritional requirements. There are, however, no reliable records of major changes in the habitat either naturally or due

to human influence; but when poaching pressure increases then the surviving animals have to seek sanctuary elsewhere.

Poaching indeed causes a fall in population density because it influences natality and mortality balance in favour of increasing mortality rate. This activity may also interfere with population composition and thus with territorial behaviour, both of which are important parameters in reproductive success. There have been very few poaching reports in the Ngorongoro Conservation Area Authority. Fosbrooke (1972) for example, reported five cases per annum. Apart from this, the only other reliable reports have been made by the present authors who found four rhinos speared and their horns removed. If the poaching rate increases, rhinos are bound to emigrate into the Northern highland forest reserve, the Maswa game reserve and the Olduvai Gorge and all these areas are next to human settlement. The rhinos will therefore find themselves sandwiched between human settlement pressure on the one hand and poaching pressure from the Crater floor on the other hand; and they will be in greater danger of being exterminated.

Road construction and tourist impact can cause habitat deterioration and may further lead to increased emigration. Rhinos can be unobtrusive and may move from areas of clear sightings to areas of low sightings because of increased tourist interference.

In view of the above findings the following measures are urgently recommended. Anti-poaching exercises must be reinforced. It seems that the Crater floor is more vulnerable to poaching than thought earlier because of the entry and exit routine with no visitors present during the late evenings and early mornings which are, therefore, the most opportune times for this poaching to take place. It is suggested that patrols on foot should be carried out during these strategic hours.

More research is necessary both in the Crater and its periphery in order to ascertain the conservation status and other ecological aspects of rhinos in the whole of the Ngorongoro Conservation Area Authority.

Conclusion

Although it is true that poaching of rhinos is going on in the Crater floor, the 1978 census shows that there are enough rhinos in this area to satisfy tourist curiosity and that if the above recommendations are heeded this rhino population will increase. The present low sightings of rhinos may also be due to seasonal utilization of different habitats. It must be borne in mind that the more spectacular individuals are indeed vulnerable to natural mortality.

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