

A CENSUS OF RHINOCEROS
IN
CHITWAN NATIONAL PARK AND TAMASPUR FOREST
BY

E. Pelinck and B. N. Upreti

JUNE 1972.

CONTENTS

- I SUMMARY
- II INTRODUCTION
- III SURVEY DESCRIPTION
 - 1. Helicopter
 - 2. Groundcheck
- IV FINDINGS
 - 1. Number in Survey Area
 - 2. Total number and distribution of rhinoceros in Nepal
 - 3. Age
 - 4. Habitat
 - 5. Length of horn
- V DISCUSSION
 - 1. Helicopter
 - 2. Elephants
 - 3. Reliability
 - 4. Time of the year
 - 5. Previous census
- VI ACKNOWLEDGEMENT
- VII LITERATURE

APPENDIX - RECORDING SHEET

MAPS

- 1. Survey area
- 2. Distribution of rhinoceros in NEPAL

I. SUMMARY

1. From a combined helicopter and ground survey, the rhinoceros population of the area surveyed was estimated between 102 and 122 animals.
2. From the above survey combined with reports from rhino guards and personal observation, the total Nepalese rhino population is estimated at between 120 and 147 animals.
3. Of the individual rhinos seen during the survey 25% were judged juveniles.
4. The distribution of rhinos indicates that only the North eastern and western section of the Park carry a sufficient number for viable breeding.
5. During the hot season the habitat of the rhino is not restricted to wallows and grasslands. A significantly large number (40%) were found in forested areas.

II. INTRODUCTION

A census of rhinoceros was taken in the area of the proposed Chitwan National Park and 2.7 square miles of forest South of Tanaspur in Nawalpur District from May 20th to May 25th, 1972.

An extensive helicopter survey of a large area was compared to an intensive ground survey from elephants of smaller areas.

The members of the census team were:-

Mr. H. J. Berry	-- Project Manager, Nawalpurasi Project
Dr. R. J. Fleming, Jr.	-- Wildlife Consultant, Nawalpurasi Project
Mr. B. B. Shah	-- Conservator of Forests, HMG
Mr. B. N. Upreti	-- National Parks and Wildlife Conservation Officer, HMG
Dr. C. McDougal	-- Manager Tiger Tops Hotel
Mr. E. Polineck	-- FRO Associate Expert Wildlife Management

III. THE SURVEY

1. Helicopter

The 27.7 square miles covered by helicopter consisted of 50% grassland and 50% forest (FRS maps based on 1964 aerial photos). Seven separate areas were chosen where personnel

experience and discussions with the rhino wardens indicated that about 90% of the Nepalese rhino population live. (Map No. 1)

The helicopter flew at 20 - 30 mph. at an altitude of 30 - 100 ft. for three hours between 11:00 and 15:30 on 21 May, 1972. The number sighted is shown in Table 1.

TABLE 1 - Vegetation, flying time and number seen from helicopter.

No.	Location	Area (square miles)			Flying time (min)	Number seen
		Grass	Forest	Total		
I	East of Simara Ghol	0.9	1.4	2.3	25	12
II	Simara Ghol - Jarnali	4.4	1.8	6.2	40	7
III	Sukhibar - Tiger Tops	5.0	4.0	9.0	30	13-15 ¹
IV	Khorla Mohan	2.7	1.7	4.4	25	2
V	Bandar Jhula Tappu North (50%)	0.2	1.4	1.6	15	0
VI	Bandar Jhula Tappu South (50%)	0.5	1.0	1.5	15	0
VII	Tamaspur	0.2	2.5	2.7	20	0
TOTAL		13.9	13.8	27.7	170	34-37

¹ Because the enumerators could not communicate during the flight, a difference is recorded here. In all other areas both enumerators had the same number.

2. Ground check

During several days before and after the helicopter survey ground checks were done with the help of 12 elephants in four selected areas. All these four areas were sufficiently isolated that the rhinoceros seen from the air could be expected to be still in the same area and only a limited possibility of migration seemed to exist. The area traversed on elephant was estimated from the maps and from

The number of elephants seen while surveying. In forest the width of elephant coverage is about 50 yards, while in open grassland it varies from 75 - 150 yards. It was possible to do only a 70% ground check of the selected areas because of swamps and other physical factors. The percentage covered varied from 50 - 90%. To get an estimate of the number present in the selected areas the number actual seen had to be multiplied with $\frac{100}{\% \text{ covered.}}$

During the counting of rhinos from the elephants recounting of the same individual by another enumerator was possible. However in nearly all the sightings sufficient data were recorded to enable the enumerators to decide whether rhino's were recounted or not. Nevertheless, to allow for possible recounting, a reduction of 10% has been made to get a reliable minimum number. The estimated number to be present in the selected areas is shown in Table 2.

Table 2 - Rhinoceros seen from elephants and estimated number to be present in selected areas.

Location	Elephant hours	Area (sq. mile)	Area covered	Percentage covered	Number seen	10% reduction	Number present
I+II	35	8.5	5.7	67 ¹	36	32	48.5
IV	42	4.4	3.4	90	12	11	12.5
V	20	1.6	0.8	50	6 ²	6	6
VII	9	2.7	2.2	80	8	7	9.5
TOTAL	106	17.2	12.1	70	56	50	69.5

¹ Itharni island was not covered, 80% of the rest was surveyed.

² However tracks of at least 3 individuals were seen.

IV. FINDINGS

1. Number in Survey Area.

Of the total number of 34-37 seen from the helicopter (Table 1) 21 were seen in the selected areas I, II, IV, V, VII. From the elephants 56 rhino's were counted in these areas and

a total of 34 - 37 are estimated to be present (Table 2). The relation between number seen from the air and number actual present varies between $\frac{69}{21} = 3.29$ and

$\frac{77}{21} = 3.67$. For the total number of 34 - 37 seen from the

helicopter a lower correction factor of 3.29 and a higher correction factor of 3.67 can be applied. From these figures it could be argued that the number of rhinos in the area covered by helicopter is not less than 112 and not more than 136. However as only areas III and IV were left out completely of the ground check they should have a population of at least $112 - 69 = 43$ and at the most of $136 - 77 = 59$. This is unlikely. For the total number too much influence is carried by the number seen in area III, where 16 rhinos were seen. Although Table 2 states the number in area V to be 0, tracks indicate the presence of some individuals. From personal experience it is estimated that the number in areas III, V and VI is more likely between 33 and 45. A reliable minimum number is therefore 102 and the maximum number in the area surveyed does not exceed 122.

2. Total Number and Distribution of Rhinoceros in Nepal

During our survey on elephants rhinoceros or their tracks were seen outside the areas covered. Also from personal experience and from discussions with rhino guards we estimate that outside the areas shown in Table 1 about 20 - 30 rhinos live. Table 3 and Map 2 shows the number of rhinoceros and their distribution in Nepal.

TABLE 3 - Distribution of Rhinoceros in Nepal

Area No.	Location	Basis	Number
I, II	Seraha, Jumali	Elephant, helicopter, guards	48-54
III, IV, IVA	Tiger Tops	Elephant, helicopter	40-45
V, VI, VII, VIII	Banar Jhula, Talaspur	Elephant, helicopter, guards	18-23
IX	Mahendra National Park	Guards	2-5
X	East of Itharni	Guards	4-8
XI	Rest of Nat. Park	Personal experience	3-12
			120-147

Because the rhinoceroses move during certain periods of the year over distances of probably up to 5 miles the figures shown in Table 3 can vary from time to time. Table 3 shows however, that there are only two areas where the number of rhino present is sufficient for viable breeding and survival: from Soudhi to Jaralli and around Piper Tops Hotel.

3. Age

The census provided an excellent opportunity to get more information on the rhinoceros. The most important factor for the survival of a species is its regeneration. From the helicopter and from the elephants we recorded 78 different individuals of which 19 were judged juveniles. It is interesting to note that nearly the same percentage was recorded during the helicopter survey (24%) as well as during the groundcheck (25%). Where possible the age of the juveniles were estimated; because of insufficient knowledge and experience individual mistakes might have occurred. However at least five of them were less than one year old and two not more than 1 month. Table 4 shows the age structure of the rhinoceros seen.

Table 4 - Age Structure of Rhinoceros

	Helicopter		Elephant		All different individuals seen		Juveniles
	Number	%	Number	%	Number	%	
Adult	28	76	47	75	59	76	
Juveniles	9	24	16	25	19	24	
0-1 year							5
0-2 year							6
2-3 year							4
Unknown							4
Total	37	100	63	100	78	100	19

The above figures indicate that the age structure is quite satisfactory under the present conditions. However these figures have been derived from areas of good rhino population. Smaller groups inside and outside the Park may have a smaller percentage of juveniles. The above shown figures seem also to confirm that young rhinos stay with their mother for about three years as reported by the rhinoguards.

4. Habitat

Nearly all the rhinos seen were resting, either in the shade of trees or in willows and tall grass. They only moved after they were disturbed at a distance of about 50 yards. As the census was carried out between 08:00 and 18:00 hrs., it gives a good information on the habitat that rhino is using in day time during the premonsoon months. As could be expected, the percentage of rhinos seen from the air was relatively larger in grass and willows than that seen from the elephants.

Table 5 shows the use of habitat by rhinoceros during day time.

Table 5 - Number seen in different habitat

	Willow	River	Grass	Forest	Total
Helicopter	22	0	9	6	37
Elephant	18	2	12	31	63
All individuals	33	2	12	31	78

The most significant aspect of these figures is the large number of rhino's present in forest. In spite of the hot weather 40% of all the individuals seen were in the forest, mostly in dense undergrowth. An important aspect is also the fact that from the helicopter only 16% were seen in forest, while from the elephants 50%. Because the areas selected for ground checks by elephants had the same distribution of grassland and forest as the areas covered by helicopter survey the difference in visibility in different habitat between elephant and helicopter does not affect the correction factors for the number present.

5. Length of horn

During the counting from elephants the length of the horn was estimated wherever possible. It is admitted that the estimated length differs from the actual length, but the difference is most probably not more than $\pm$ 2 inches. Of 23 individuals it was possible to estimate the length, as is shown in Table 6.

Table 6 -- Estimated length of horn

Length (inches)	Number
0	2
2	2
3	9
4	4
5	3
6	1
9	1
10	4
12	1
15	1
	28

The average length is 5 inches. Prater (1971) states that the average length of the horn of the Indian rhinoceros is 8". The smaller length of the horn in Chitwan might be an indication of selective shooting by poachers for the biggest horn or it may be due to some other conditions.

Unfortunately the length of the horn is no indication for the age because the length is generally known to decrease after the age of 15 - 20 years.

V. DISCUSSION

The census has provided very valuable information on the present status of the rhinoceros in Nepal. The information will however be even more valuable if every year a census is being taken. For example no explanation can be given now why Caughley and Hidera (1968) saw only 9% juveniles, while the present survey shows 25% juveniles. If every year a census is carried out in the same areas using the same or improved methods increasing knowledge about regeneration, habitat, etc. can be used for the management of the Park.

1. Helicopter

The helicopter survey proved to be most interesting and very useful in getting a good view of different habitats. Especially in swamp areas rhinos were seen where elephants

are unable to reach. However the rhinoceros is difficult to see in forested areas, especially in the riverine forests on the islands and along the Macayani river. As has been shown above a census by helicopter should always be accompanied by an intensive ground check.

2. Elephants

Elephants are the only way of travelling in rhino habitat and proved to be most efficient. However it is not always possible to keep in close contact. An improvement should be the use of small radios by some of the enumerators to prevent recounting and to go at the same distance and speed.

3. Reliability

Because the costs of a helicopter survey, covering all rhino habitat at a low speed and with a distance between the flightlines of 200 yards are too high, the number seen from the helicopter cannot be used as a random sample. Also the ground checks by elephant are not a 100% ground check. An additional limitation for statistical analysis is the presence of up to 10 individuals in a small area and only few in large areas.

However 78 individual rhinos were seen during the census and in our opinion the number estimated to be present in Nepal is reliable and reasonable.

4. Time of the year

Although the driest season of the year gives the best chance of seeing rhino in wallows, it was found that the grass is in many places at least 8 ft. high and all trees have leaves. It is therefore probably advisable to do yearly censuses in mid March when Simal and Sal have lost their leaves and most of the grass has been burnt.

5. Previous census

A rhino census by helicopter and limited ground check was carried out by Caughley and Mishra in 1968. During 5 1/2 hours of flying they saw 45 rhinoceroses; during 7 hours on elephant in forest they saw four. Based on these figures they estimated the number of rhinoceroses in Nepal to be between 31 and 108.

The importance of habitat representation as well as a large coverage by elephant has been emphasized above. The minimum difference of 12 individuals may therefore be more because of a lower estimate by Gaughley and Mishra than because of an increase in number during the last four years. There is however no explanation for the low percentage (9%) of juveniles compared with the 25% seen during this census. In their report they describe guesses made by other authors, as shown in Table 7.

Table 7 - Guesses and estimates of number of rhinos in Nepal.

Year	Numbers	Authority
1950	800	Willan, 1965
1957	400	Stracey, 1957
1959	300	Gee, 1959
1966	100	Spillet and Tanang, 1967
1968	81 - 108	Gaughley, 1968
1972	120 - 147	This report

These guesses are not population estimates but show the decline in numbers from 1950 to 1965 and hopefully a stabilization during the last 5 years. Part of this may be due to the resettlement programme in 1965, when nearly all farmers south of the Rapti river were removed and resettled elsewhere.

If the same type of action is taken to prevent grazing South of the Rapti, the future of the rhinoceros in Nepal will not be without hope.

VI. ACKNOWLEDGEMENT

The census should not have materialized for a long time without the generous cooperation of the Project Manager of the Nawalparasi Project in providing the helicopter. His Majesty's Government's Forest Department had organized 10 elephants to be present in four different locations on all the dates required. The elephant drivers were most cooperative to work full days although the temperature was more than 100°F. Tiger Tops Hotel provided two elephants and much information about the surrounding areas.

VII. LITERATURE

- Gee, E. P. (1959) - Report on a survey of the rhinoceros area of Nepal, March and April 1959. Oryx 5: 30 pp.
- Gee, E. P. (1959) - Report on a brief survey of the wildlife resources of Nepal, including the rhinoceros, March 1963. Oryx: 67-76.
- Fraser, S. H. (1971) - The book of Indian mammals. Bombay: Bombay Nat. History. Soc. 3rd edition.
- Spillett, J. J. (1967) - Brief summary of the status of the great Indian one-horned rhinoceros. J. Bombay Nat. History. Soc. 63: 573-5.
- Spillett, J. J., and Tamang, K. K. (1967) - Wildlife conservation in Nepal. J. Bombay Nat. History. Soc. 63: 557-72.
- Stracey, F. D. (1957) - On the status of the great Indian rhinoceros (R. rhinoceros) in Nepal. J. Bombay Nat. History Soc. 54: 753-66.
- Willén, R. G. M. (1965) - The Chitwan Wildlife sanctuary in Nepal. IUCN Bull. October-December 1968: 8.
- Caughley, G. J. and Mishra, H. R. (1968) Interim Suggestions Wildlife in Nepal
1. The Rhino Sanctuary (Preliminary report)
HKI/UNEP/IO (EF) Trisuli Watershed Development Project, Kathmandu

REF ID: A6782

WINDMILL CREEK - COLUMBIA RIVER, WASH.

EXPERIMENTAL:

HELICOPTER/ELEPHANT:

SHEET NO. :

RHINOCEROS - GAIDA

[illegible]

BAGI

[illegible]

MAP I

IX

II

I

X



