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SURVEY OF NON-HUMAN PRIMATES OF NAYAGARH DISTRICT OF ORISSA, INDIA

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INTRODUCTION

Field studies on non-human primates of Orissa was undertaken by Zoological Survey of India during 1978 under a project on Non-Human Primates of India (Tiwari and Mukherjee, 1992). Behura *et al.* (1969) reported the wildlife fauna of Orissa; Tiwari *et al.* (1997) published the sightings of monkeys at Chandaka Wildlife Sanctuaiy. Nayagarh district earlier was in the Puri district. The Puri district was divided into three districts in the year 1994, the other districts are Puri and Khurda. This report deals with the information regarding distribution, abundance, social composition and status of rhesus monkey (*Macaca mulatta*) and Hanuman langurs (*Semnopithecus entellus*) of Nayagarh district, Orissa. In this district, the rhesus monkeys were strictly restricted in the forests and hills while the Hanuman langurs were distributed both in the hills and in the village fringes and towns. These two common species of monkeys that are found in many parts of India, inhabiting in diverse habitats from dense forests to open lands and human habitation as also in montane and arid zone.

STUDY AREAS

Nayagarh district is situated somewhat in the southeast part of Orissa, lies between 84°30'–85°19' E longitude and 19°54'–20°34' N latitude. The area of the district is about 3954^2 km with a human population of 196 people/km^2 (2001 census). The configuration of the land displays a promiscuous and broken mountain system intersected by numerous plains and valleys. The rise and fall of the hills do no follow any systematic order. The hiss and dales are interspersed by many nallas and rivers. There are also many isolated scattered hills throughout the district. The highest peak is about 855 m. The alluvium soil are very much limited in this area and are mainly confined to the banks of river and other watercourses. Laterite soil and redloam cover the large areas of the district.

The mean maximum and minimum temperature varies from 44°C to 11.6°C depending upon the seasons. The district shows that the summer is hot and the winter is mild. Average rainfall per year approximately 1130 mm. Mahanadi is the main river, which flows on its northern boundary.

The total area of the district under forest cover is about 1160^2 km, which forms 31% of its total geographical area. The major trees are *Mangifera indica*, *Terminalia arjuna*, *Terminalia tomenstosa*, *Terminalia belerica*, *Delbergia paniculala*, *Buchanalia lanzan*, *Anogeissus latifolia*, *Hymendictyon excelsum*, *Bridelia retusa*, *Diospyros melanoxyion*, *Strychnos nuxvomica*, *Schleichera oleosa*, *Mirtragyna parvifolia* and few sal (*Shorea robustd*) plantations. Bamboos are very common plants in the hills.

METHODS

The survey methods applied in Nayagarh district were the same that was adopted in Purulia district survey of West Bengal (Chaudhuri *et al.* 2004). The observations were carried out both on foot and by a vehicle. Villages, towns, temples, roadsides and forests in the plains were surveyed. The point method was adopted for locating monkeys in the hills. Total count and sweep sampling methods were used to estimate the population. The survey was carried out from 0700 to 1130 hours and again from 1500 to 1800 hours with three observers. The field trip was made during August-September 2005. A total of 150 hours were spent in the census work. About 1580-km^2 area was surveyed. The groups when located, their social structure, habitat, inter-intra group interactions were recorded. The individuals of a group were broadly classified as adult males, adult females, juveniles and infants. The sub-adults of the groups were placed in the juveniles and adults population depending upon their age and size.

RESULTS

A total of 1580-km^2 was surveyed which comprised about 40% of the total geographical area of Nayagarh district. 30 groups of Hanuman langurs and 10 groups of rhesus monkeys were observed. These 30 groups of Hanuman langurs were sighted in the villages, hillforests and towns (Fig. 1). As the majority of the villages and towns of the Nayagarh district were having hills/ hillocks within the villages and towns and the langurs inhabited both in the plains and hill habitats in some period of a year so, the groups were not classified in habitatwise categories.

Hanuman langur : The 30 langurs groups contained 748 individuals of which 48 were adult males; 391 were adult females; 133 were juveniles and 157 infants. The social composition and distribution of langurs are given in Table-1. One group of langur, composed of one sub-adult male and one sub-adult female, was recorded at Khomarshai village, c.14 km from Daspalla town. Local inquiry revealed that in early 2004, a group of 11–12 langurs inhabited in this area and subsequently left the village and move towards the nearby hillock leaving behind these two

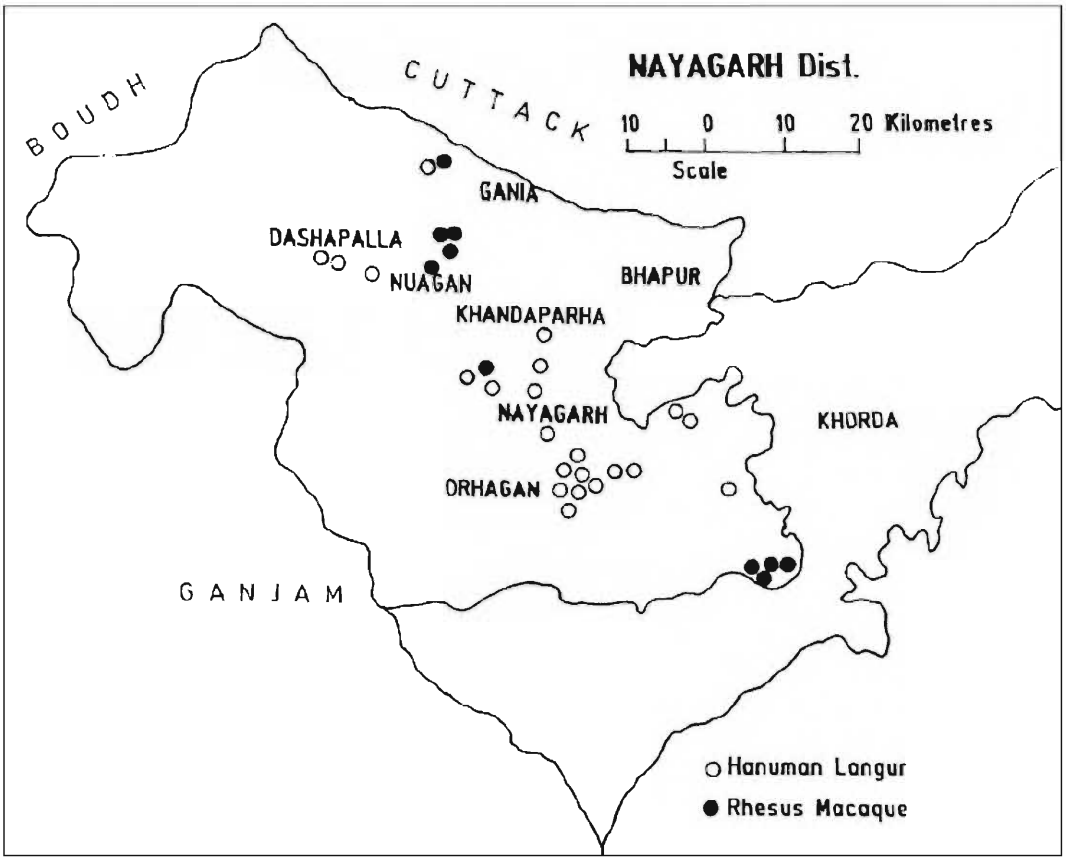

Fig. 1. : Distribution of Hanuman Langur and Rhesus Macaque.

individuals, those were juveniles at that period. These two langurs now became at sub-adult stage and inhabiting in the roadside trees of Khomarsahi village. We tried to understand from the villagers what cause or threat forced the group to move out leaving behind the juveniles, which did not show the natural phenomenon in primates. Moreover, the village contained sufficient feeding trees and good shelter for the langurs to harbour. The villagers however, did not confirm anything. These two sub-adults were not taken into account during the analysis of data. The group size varied from 10 to 42 langurs. The mean group size was 24.9 ± 1.92 (Fig. 3). This provides a population estimate of 0.02 groups/km^2 and 0.49 langur/km^2. The mean density of Hanuman langur is shown in Fig. 3.

Out of 748 langurs the percentage composition in the population were 8.95% adult males; 52.27% adult females; 17.78% juveniles and 21.0% infants (Table 1). About 40% females were having infants. The ratio of adult males to adult females was 1 : 5.8 and adult females to infant were 1 : 0.40. The ratio of adult females to combined population of sub-adults was 1 : 0.74.

Table 1. : Group size and distribution of bisexual Hanuman Langurs in Nayagarh-2005.

Sl. No.	Locality	Total	Adult Male	Adult Female	Juvenile	Infant
1.	Raghunathpur	12	1	7	2	2
2.	Kotagarh	21	2	11	4	4
3.	Sarendopur	22	3	11	3	5
4.	Sarendopur	17	2	8	3	4
5.	Lodhyachu	30	3	17	5	5
6.	Solapata	40	3	24	5	8
7.	Kalyanpur	19	2	12	2	3
8.	Kalyanpur	42	4	22	6	10
9.	Sabdevpur	38	3	21	6	8
10.	Vinayakpur	34	2	19	5	8
11.	Sarankul	25	2	14	3	6
12.	Kotadhari	21	2	13	2	4
13.	Durdua	43	4	20	11	8
14.	Kusthachandrapur	10	1	5	2	2
15.	Kadua	36	2	18	3	13
16.	Hatkada	20	2	10	3	5
17.	Nayagarh	15	2	8	2	3
18.	Daspalla	20	2	11	3	4
19.	Korada	14	1	8	3	2
20.	Andarkote	10	1	6	1	2
21.	Khandapara	19	2	11	2	4
22.	Lankasahi	16	2	9	2	3
23.	Madhupura	23	2	12	6	3
24.	Balugaon	24	2	14	5	3
25.	Govindapur	37	3	19	7	8
26.	Kalimati	31	3	15	7	6
27.	Gopalpur	14	1	7	3	3
28.	Ranpur	19	2	9	5	3
29.	Kontilo	47	4	17	15	11
30.	Khandapara	29	2	13	7	7
	Total	**748**	**67**	**391**	**133**	**157**
	Mean	**24.93 ± 1.92**	**2.23 ± 0.16**	**13.03 ± 0. 94**	**4.43 ± 0.54**	**5.23 ± 0.53**
	%		**8.95%**	**52.27%**	**17.78%**	**21.0%**

In 1978 Zoological Survey of India team was conducted field surveys in Puri district under a DST Project. Nayagarh is a part of the then Puri district later it was raised to a separate district. 16 social groups of Hanuman langur and 1 all male group was recorded with a total of 217 individuals from Nayagarh part survey (unpublished). Tiwari and Mukherjee (1992) published the account of non-human primates of Orissa containing a number of districts, but no separate district wise results were mentioned. The all male group was consisted of 5 langurs. The 16 bisexual langur group consisted of 212 langurs with an average group size of 13.25 ± 1.63 individuals. These social groups composed of 20 adult males (1.25 ± 0.11); 123 adult females (7.69 ± 0.93); 43 juveniles (2.69 ± 0.55) and 26 infants (1.63 ± 0.45) (Fig. 3). The group size varied from 4 to 26. The adult males to adult females' ratio were 1 : 6.15. Adult females to juveniles and infants ratios were 1 : 0.35 and 1 : 0.21 respectively. The percentage composition of different sexes and age class was 9.43% adult males, 58.0% adult females, 20.3% juveniles and 12.27% infants. 21.1% females were carrying infants.

Rhesus macaque : In Nayagarh district 10 groups of rhesus monkeys were recorded in 2005 survey. The areas and the distribution of monkeys are shown in Fig. 1. The 10 groups contained a total of 292 monkeys and the composition consisted of 36 adult males; 152 adult females; 52 each were juveniles and infants. The rhesus population of 2005 survey is shown in Fig. 2 The mean group size was 29.2 ± 1.84 individuals per group of which 3.6 ± 0.31 were adult males; 15.2 ± 1.10 were adult females; 5.2 ± 0.63 were juveniles and 5.2 ± 0.61 infants (Fig. 4). The group size varied from 21 to 41 monkeys. The percentage composition of 292 monkeys were 12.3% adult males; 52.1% adult females; 17.8% each were juveniles and infants. The adult males to adult females' ratio were 1 : 4.22 and adult females to juveniles and infants' ratios were 1 : 0.34 each. About 34.2% females were seen carrying infants. The distribution and social composition are given in Table 2.

During 1978 census, a total of 6-rhesus monkey groups with a total of 360 monkeys were recorded. The average group size was 60 ± 13.25 monkeys per group of which 6.50 ± 1.45 were adult males; 22.67 ± 4.88 were adult females; 20.00 ± 5.39 were juveniles and 10.83 ± 2.44 infants (Tiwari and Mukherjee, 1992). Out of 360 monkeys, 39 were adult males, 136 were adult females, 120 were juveniles and 65 infants. The results of 1978 and 2005 surveys are shown in Fig. 4. The adult males to adult females ratio was 1 : 3.48 and adult females to juveniles and infants ratios were 1 : 0.58 and 1 : 0.47 respectively. The number of infants was considerably low in the population. 47.8% females were carrying infants. The percentage composition consisted of 10.8% adult males, 37.8% adult females, 33.4% juveniles and 18.0% infants.

DISCUSSION

The rhesus monkeys of Nayagarh district were seen inhabiting in the forests and in the hills. These monkeys were reported to invade in the agricultural fields during crop raising time and

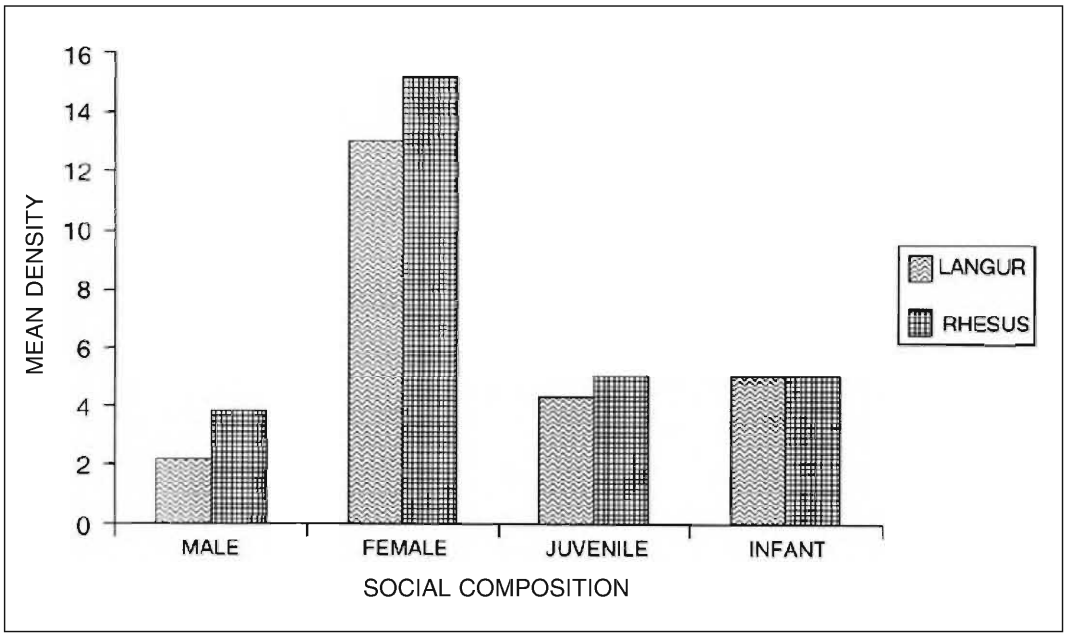

Fig. 2. : Hanuman langur and Rhesus macaque population of Nayagarh-2005.

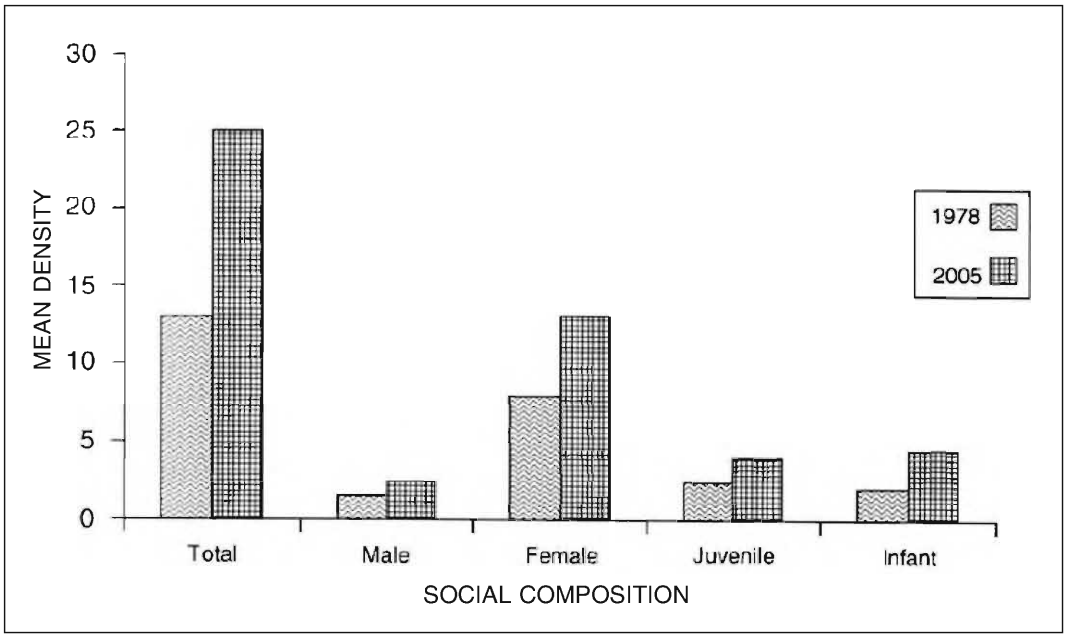

Fig. 3. : Mean density of Hanuman Langur of Nayagarh.

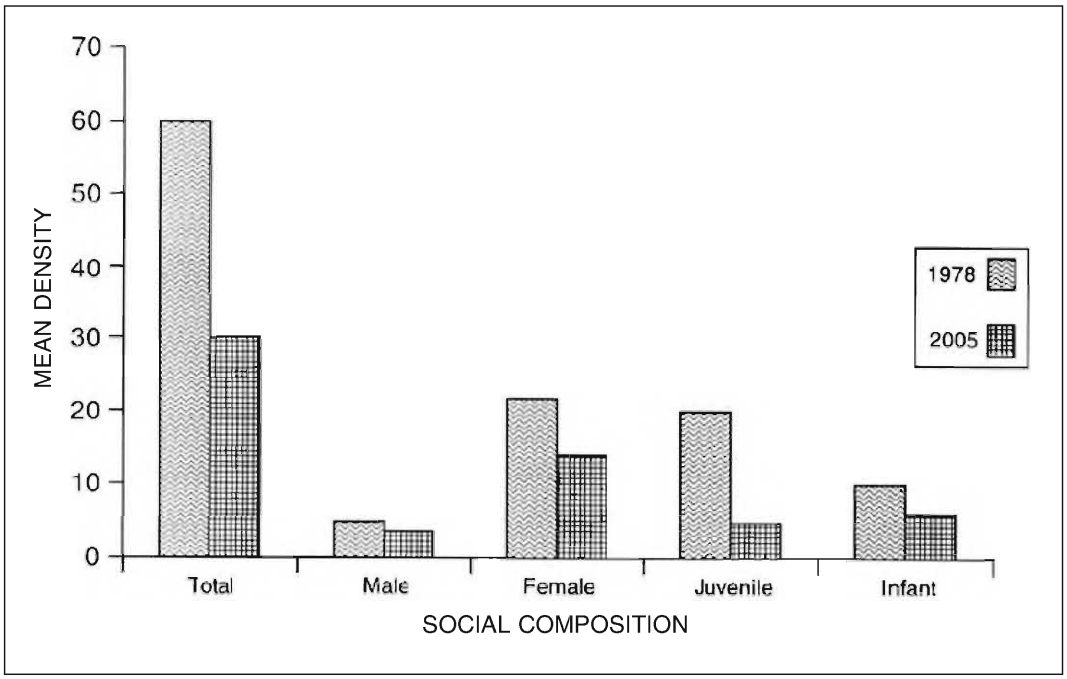

Fig. 4. : Mean density of Rhesus Macaque of Nayagarh.

Table 2. : Group size and distribution of Rhesus macaque of Nayagarh districi-2005.

Sl. No.	Locality	Total	Adult Male	Adult Female	Juvenile	Infant
1.	Kustha Chandrapur	21	4	9	5	3
2.	Baka Forest	41	6	22	9	4
3.	Baka Forest	26	4	13	7	2
4.	Patichandi	30	3	14	7	6
5.	Korado	30	3	16	5	6
6.	Kuanria Forest	34	4	17	5	8
7.	Kuanria Forest	22	3	12	3	4
8.	Kuanria Forest	29	3	16	3	7
9.	Lankasahi	32	3	17	5	7
10.	Ramchandi	27	3	16	3	5
	Total	**292**	**36**	**152**	**52**	**52**
	Mean	**29.2±1.84**	**3.6±0.31**	**15.2±1.10**	**5.2±0.63**	**5.2±0.61**
	%		**12.3%**	**52.1%**	**17.8%**	**17.8%**

maize cultivation. The hill forests of Nayagarh provides food and shelter to these monkeys from July to early part of January. After that due to scarcity of water and food the monkeys took shelter in the villages and roadside trees. The majority roads in this district having big trees on either side, of which mango is the predominant one. So, there is two type of habitat for most of the monkey groups-7 months in the hill forests and 5 months in the villages. The Hanuman langurs on the other hand inhabited both in the villages, towns and hills but they regularly visited both the places without maintaining any specific time period. Villages and fotrests of Nayagarh district represented the most favourable habitat categories for both the species of monkeys as they contained a variety of trees and plants.

The 1978 survey was conducted in the month of May and the present survey was conducted during September-October 2005. Therefore, the comparison of the two surveys was not possible for significance tests; moreover, the habitable areas were also different. However, from the recorded data of the two surveys revealed that the rhesus population did not vary much, only the group size was decreased. During 1978 census the group size was between 48 and 90 individuals but in 2005 survey it was found the largest rhesus group contained only 47 monkeys. Latest survey also revealed that the Hanuman langur population was increased considerably and occupying the most of the areas of the district. This resulting in direct competition with the rhesus monkeys in respect of food and shelter. In 1978 survey only 217 langurs were recorded in 17 groups whereas during the 2005 survey 30 groups with a total of 748 langurs were observed. So, there was more than three-time increase in the langur population over the years. It also showed that rhesus monkeys could not able to flourish at the same pace though good forest cover (31%) still exists in this district.

Man-monkey interactions were very less in this part of Orissa. The monkeys in Orissa enjoyed protection due to religious and philosophical belief till today. In other states of India, these monkey now days have come increasingly intolerant to the people. The taboos had broken down and people particularly the villagers considered the monkeys' agricultural pests. Hopefully, this factor did not affect in Orissa as such the monkeys inhabit in the state without any major interaction with the people.

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REFERENCES

Behura, B.K. and Guru, G.B. 1969. Wildlife of Orissa. *Prakruli (Utkal Univ. J. Sc.*, **6** *:* 95-126.

Bhuinya, S., Chaudhuri, A. and Murmu, A. 1993. Survey of non-human primates of three districts of West Bengal. *Rec. zool. Surv. India*, **93**(1-2) : 1-14.

Chaudhuri, S., Murmu, A., Mazumdar, P.C. and Alfred, J.R.B. 2006. Rhesus Monkey, *Macaca mulatta* in three northern districts of West Bengal, India. *Rec. zool. Surv. India*. **106**(1) : 1-10

Chaudhuri, S., Murmu, A., Talukder, B. and Aired, J.R.B. 2004. A population survey of Hanuman langurs in the distrct of Purulia, West Bengal. *Rec. zool. Surv. India*, **103**(3-4) : 47-54.

Southwick, C.H. and Siddiqi, M.R. 1966. Population changes of rhesus monkeys (*Macaca mulatta*) in India, 1959-1965. *Primates*, **7**(3) : 304-314.

Tiwari, K.K. and Mukherjee, R.P. 1992. Population census of Rhesus macaque and Hanuman langur in India-A Status Survey Report. *Rec. zool. Surv. India*, **92**(1-4) : 349-369.

Tiwari, S.K., Alfred, J.R.B. and Patnaik, S.K. 1997. An account of the mammalian fauna of Chandaka Wildlife Sanctuary, India. *Rec. zool. Surv. India*, **96**(1-4) : 25-38.