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Community status, distribution and behavior of wild primates in Intanki national park, Nagaland

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Abstract
The study was carried out from the month of January to April 2018 at the Intanki National park, Peren, Nagaland, India. The study recorded 5 species of primates namely, Hanuman Langur *Semnopithecus entellus*, Rhesus Macaque *Macaca mulatta*, Capped Langur *Trachypithecus pileatus*, Stumped tail Macaque *Macaca arctoides* and Hoolock Gibbons *Hoolock leuconedys*, with a population of 212 individuals in total. Hanuman Langurs having population size of 69 individuals had the highest number of individuals of all the primates in the Intanki National Park whereas Hoolock Gibbons had the lowest number of population with 30 individuals. The sex ratio was also calculated for all the primates in total which showed 29:40 i.e. 29 males to 40 femalesThe Behaviors of the primates showed that total 50% of the days were used by stumped tailed Macaques for their feeding which was the most percentage of days used by any primates for feeding, the study also indicated that Hoolock Gibbons having no more than 2 males and two females per troops indicating mating pairs which is not seen in any primates species residing in Intanki National park. Lastly the status compared with the IUCN Criteria's of List showed that all five species of primates in Intanki National park to be Critically Endangered in Intanki National park.

Keywords: Primates, status, behavior, Intanki national park

Introduction
Intanki National park is situated in Peren district which is 32km away from Dimapur district. The name "Intanki" is derived from the Zeme dialect of the Zeliang tribe which is one of the 16 tribes of Nagaland. It was declared as a national park in the year 1993 and the total area of the park is 202.02 km2. Intanki National park consists of vast stretches of grasslands, equatorial forest, semitropical and deciduous forest. It is well known for its Elephant reserve and also hosts different varieties of rare primate species. So far very little study has been made on non human primates, and even on their size and composition. Study on the behavior of free-ranging primates has been the subject of many recent field studies and as a result the comparative study of primate behavior is beginning to take a concrete shape. Some generalizations are possible and the trends apparent in recent studies can be evaluated.

The field study entitled "Community Status, Distribution and Behavior of Wild Primates In Intanki National park" was carried out from the month of January to April 2018 on different locations of Intanki National park. A total of 36 visitations to the NP, 9 times in the month of January, 12 times in the month of March and 15 times in the month of April was made, field research in the month from February to April consisted of long distance hiking deep into the jungle with main objective of determining the number of species of primates, their numbers and their location using compass and to determine the data concerning the numbers of males and females in a group, To find out the ratio of Adult male, Adult females and number of juveniles and immature members in a particular troop, and to observe their behavior.

Materials & method
Intanki national park is located in Perin district, Nagaland 37km away from main town Dimapur with coordinates (25° 18 to 25° 43N & 93° 43E). It has an area of 202 sq km with altitude ranging from 180-600mm above sea level.

The feeding behaviors of primates were studied for a period of four months (January to April, 2018) in the field. The group was followed for four days a week, each day from dawn to dusk (range 06-08 hours, mean = 07 hours per day). The help of a local guide having versatile knowledge of forest patches was taken for locating the Primate groups.

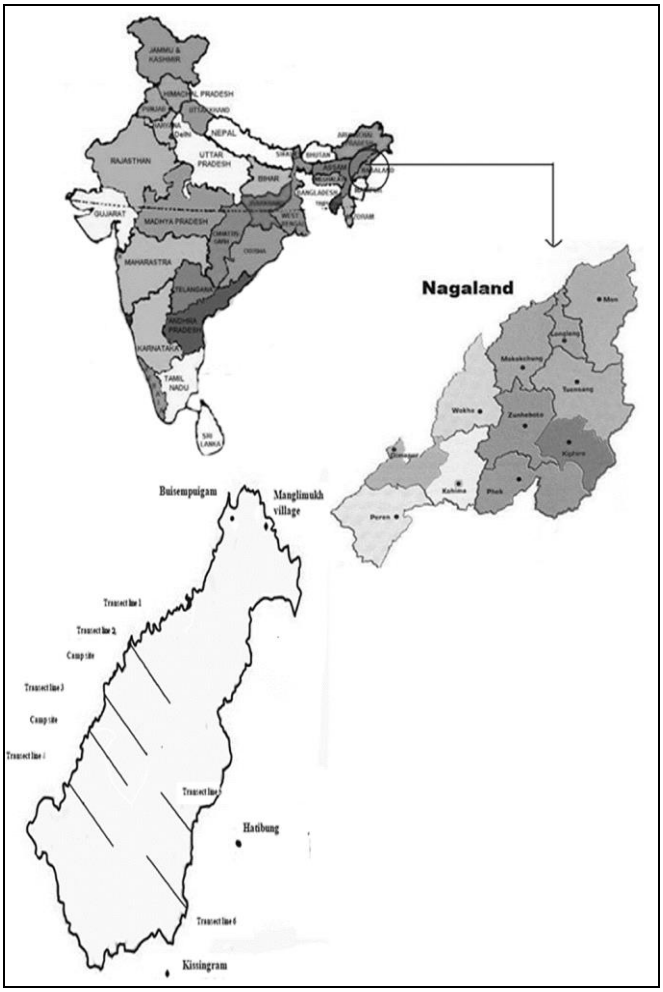

Fig 1: Location of Intanki National Park showing different transect lines and different villages

Selected behaviors have been continuously recorded every sixty seconds on a half hour scan data sheet. Percent time spent in feeding was estimated by the following formula T= (nf×100)/N, Where, T = % daytime spent feeding, nf = number of records that included feeding, and N = total number of records for the day. The Simpsons diversity index (*D*) was used to calculate the diversity of the primates in the Intanki National Park, Diversity index that is commonly used to characterize species diversity in a community. Where, S = Total no. of species in a community (richness) n_i= no. of individual in the i^{th} species, N=Total no of Individual for all species, n= is the total population of a species.

Results and Discussion

Distribution

Among the 212 individuals of Primates enamored in the Intanki National park, 38 individuals of Capped Langurs were discovered, among them 12 individuals were discovered at transect no.1. Transect no. 2 had 26 individuals of capped langures, no Capped Langurs were spotted at transect no 3, 4, 5 & 6. Transect number 2 had the most number of Capped Langur. Hanuman Langurs were the most abundant of all the species found at the Intanki National Park, total of 69 individuals were enamored from all the different transect lines of the NP. Transect 4 had 49 total individuals, transect number 2 had 11 individual Hanuman Langurs with 4 adult males, 2 troops, 2 adult females 3 immature & 2 juveniles, transect no. 1, 2 & 5 had no sightings of Hanuman Langurs, the justification for this reason may be due to the proximity of transect 1, 5 & 6 to human settlements as transect 5 being few km from Kissingram village where people hunted and consumed primates regularly. The total sex composition from all the transect lines of the Intanki Natonal Park were 24 adults, 9 immature and 12 juvenil.

Table 1: Population of primates enumerated from different transect the six transect lines.

Transect lines	Name of the Species				
	Hanuman Langur	Stumped tail Macaque	Hoolock Gibbons	Rhesus Macaque	Capped Langur
Transect 1	-	-	7	-	12
Transect 2	11	-	7	11	26
Transect 3	9	11	6	-	-
Transect 4	49	8	4	7	-
Transect 5	-	12	6	5	-
Transect 6	-	9	-	12	-
Total	69	40	30	35	38

Stumped tailed Macaques were found on all the transect lines except transect number 1 and 2, transect no. 4 had the least amount of individual Stumped tailed Macaque. Transect no. 5 had 12 individuals in total and lastly transect no. 6 comprised of 9 individual Stumped tailed Macaque. Hoolock Gibbons with 30 individuals had the least number of individuals amongst all the primates enamored at the Intanki National Park, although scares they were found on all the transect lines except transect number 6.

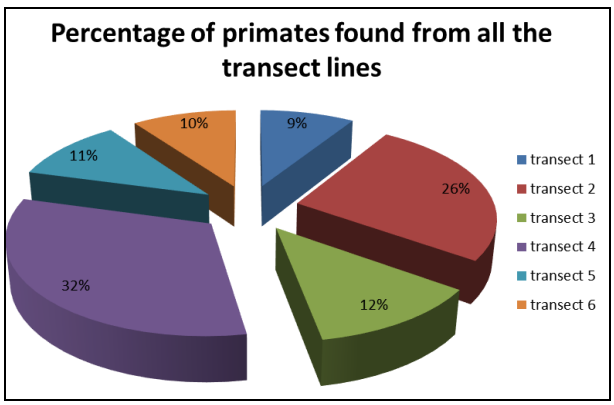

Fig 2: pie chart clearly showing that transect 2 and transect 4 are where most number of Primates

Reside, transect 4 and 2 are located at the inner region of the NP where the habitats are mostly UDH undisturbed habitat types and most of the primate species reside in this region of the habitat (view table 1). Anthropogenic factors related to human and hunting has driven the primates deep into the jungle, from the above fig we can also see that transect no. 6 and transect no. 5 has the least no of primates observed with 9% each, Capped Langurs, Hanuman Langurs & Hoolock Gibbons were missing from transect no. 5 and 6 from this we can conclude that villagers near transect no 4 and 5 from Kissingram village have a major part to play in the decline of the primate population.

Sex Ratio

For the total sex ratio Immature and juveniles primates from the troops were not considered as they were impossible to distinguish total sex ratio for adult male and adult female of Hanuman Langur was 7:2, for Capped Langurs which had 9 adult males and 13 adult females, the sex ratio was 9:3, stumped tailed macaque with 10 adult male and 17 adult female the total sex ratio was 9:3 similarly for Rhesus Macaque & Hoolock Gibbons the sex ratio between adult male and adult females was 11:15 and 12:11 respectively. Total no of sex ratio for all the adult males and adult females of primates in the Intanki National park is 29:40.

Table 2: Total sex ratio of all the primates enamored at Intanki National park from the month of January to April.

Species	Scientific name	Total Male	Total Female	Total Sex Ratio
Hanuman Langur	*Semnopithecus entellus*	16	24	7:2
Capped Langur	*Trachypithecus pileatus*	9	13	9:3
Stump tailed Macaque	*Macaca arctoides*	10	17	10:17
Rhesus Macaque	*Macaca mulatta*	11	15	11:15
Hoolock Gibbons	*Hoolock leuconedys*	12	11	12:11
Total		58	80	29:40

Study in the behavioral patterns found that Hoolock Gibbons were mainly comprised of fewer members in a troop which generally comprised of mating pairs Choudhury *et al.* (2016) [6] revealed that Hoolock gibbons after maturity generally leave the troops in search for mates, this let to the justification that only few members comprising of mating pairs of adult male and adult females and juveniles were present The data obtained from calculating time spend on feeding found that Capped Langurs spend 75% of the time feeding and the rest 25% either grooming or on naps. Stumped tailed Macaque spends 50% of their time feeding rhesus macaque speed used 40%, Hanuman Langurs spend 28.57% and Hoolock Gibbons used 20% of their time feeding.

Table 3: Percentage of day spend on feeding, by Primates at Intanki National park.

Types	Total no. of records that included feeding	Total no. of Records for the day	% of day spend feeding
Capped Langur	3	4	75%
Hanuman Langur	2	7	28.57%
Stumped tail Macaque	3	6	50%
Rhesus Macaque	2	5	40%
Hoolock Gibbon	1	5	20%
Total	11	27	40.74%

The present study found that Hanuman Langurs spend 29% of the day feeding and 71% of the days were spend on either naps or grooming (fig: 1), Hanuman Langurs known for their long prehensile tail and large troops were compact and generally consisted of more than 10 members in a troop, they were highly vocal and generally were the first to give out warning calls when they spotted danger or threats. On the other hand Stumped tailed Macaques and Rhesus Macaques were found to be highly shy and generally would shy away from danger or when they would see humans approach, Stumped tailed Macaques used 50% of their time on feeding and Rhesus macaques used 40% of the day on feeding.

Hoolock Gibbons were the most vocal of all the primates in the NP their calls could be heard from miles this made them easy targets for poachers from nearby villages as tracking was particularly easy. The study also found that Hollock Gibbons spend 20% of their days on feeding and the rest 80% on either naps or grooming.

Status

Table 4: Relative Abundance of all the primates at Intanki national Park

Name of Species	No. Of Troops	Total no of individual	Relative Abundance	Frequency of occurrence
Capped Langur	3	38	4.82	1.28%per
Hanuman Langur	6	69	9.32	0.66%per
Stumped tail Macaque	5	40	6.24	0.99%
Rhesus Macaque	4	35	5.62	1.10%
Hoolock Gibbon	8	30	4.94	1.25%
Total	25	212	30.94	5.28%

Hoolock Gibbons during the whole survey consisted of 7 troops which was the most number of troops amongst the different species of primates in the NP but there Relative abundance were the least of all the species RA- 4.94 per 1 mile the main factor for this difference may be due to the fact that Hoolock Gibbons generally tend to have only three to five members on average in a troop and has mating pairs the juveniles generally leave the troops after maturing. Groups

with more than one adult males or more than one breeding adult female have been known to occur, as have all male groups. The total number of relative abundance combined for all the primates in the Intanki National park is 30.94. and total frequency is 5.28% per 1 mile. Status of all the primates in the Intanki National park can be estimated by comparing the two table 4 IUCN Criteria's list 250 individuals or less than 250 should be present in less than <10km^2**.** Comparing the fallowing data with the IUCN criteria for Critically Endangered (CE) species, it has been found that Capped Langurs, Hanuman Langurs, Rhesus Macaques, Stumped Tailed Macaques and Hoolock Gibbons are all found to be Critically Endangered. Absolute abundance for All the primates in Intanki National park was 30.94 individuals per 1 mile with a total of 212 individuals which is critically low compared to the size of Intanki National park which is 202 km sq. Comparing Absolute abundance for Capped Langurs 4.82 individuals per 1 mile, Hanuman Langur 9.32 individuals per 1 mile, Rhesus Macaque 5.62 individuals per 1 mile and Hoolock Gibbons 4.94 individuals per 1 mile with IUCN criteria which requires 250 individuals in less than <10km square to be considered Critically Endangered it is highly evident that the primates in Intanki National park comes under Critically Endangered (CE) species. The main reason for the primates going (CR) Critically Endangered would be due to anthropogenic factors.

Conclusion

On the basis of the above view, the fallowing conclusions can be drawn. The six transect lines showed variation in the population and habitat with most species being driven into deep jungle by hunters indicated by the presence of less percentage of Primates in transect number 6 near Kissingram village (view fig number 2). The result from the behavior data indicated the difference in feeding time and the amount of day spend on feeding and the variation in the size of troops of Hoolock Gibbons as compared to other species of primates (View table number 1). The data also indicates the dire status of primates in the NP and the influence of hunting and anthropogenic factors from nearby villages namely Beisumpuikam Village and Kissingram village indicated by the transect line 6 and 5 which showed the least population of primates (view fig number 2) in the National Park.

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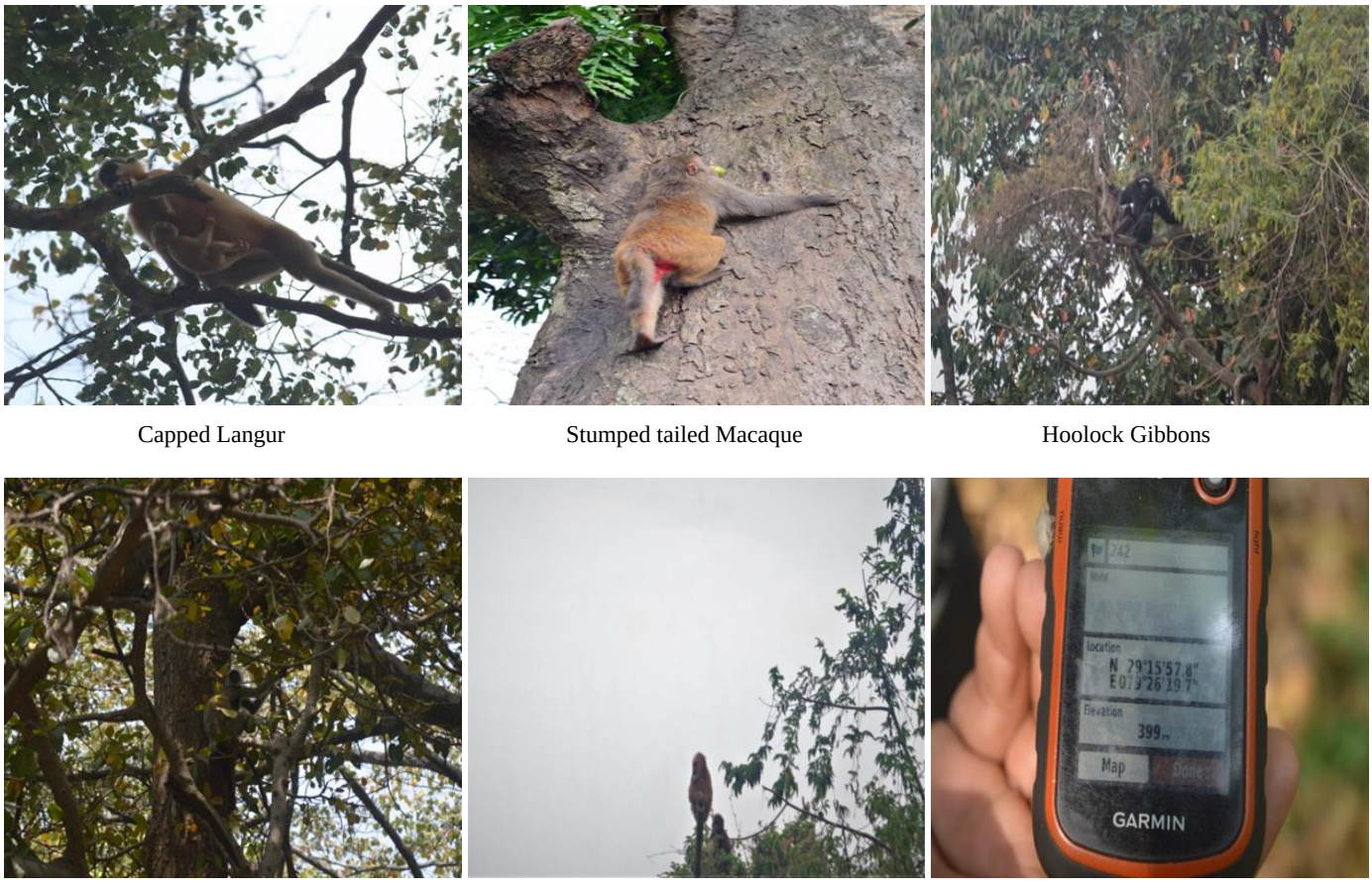

Capped Langur | Stumped tailed Macaque | Hoolock Gibbons

Hanuman Langur | Stumped tailed Macaque | GPS device used for surveying

Plate 1: Primates in Intanki National Park

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