I. INTRODUCTION

Being the only bovid with four horns, four-horned Antelope (*Tetracerus quadricornis*), commonly known as Chowsingha, is a unique mammal, reveals distinct sexual dimorphism (Prater 1980). Males (Plate 1) have horns whereas in females (Plate 2) horns are absent. It is a small sized antelope among the Bovidae family, and dull light brown in colour (Jerdon 1867; Brander 1923; Prater 1980; Swamy et al. 2016). It has preorbital glands and well developed glands between the false hooves of the hind legs (Roberts 1977; Prater 1980). It is an endemic species to the Indian subcontinent (Jerdon 1867; Brander 1923; Viceroy 1936) and its 95% of its current global population occurs in India (Rahmani 2001) the remaining 5% found in Nepal (Krishna et al. 2009). The IUCN listed the species Vulnerable (IUCN 2014). The distribution of the species is reported that it is found in all of the Indian States except Kerala (Rice 1990). Despite its wide distribution in India, this species has received very little scientific attention.

Four-horned Antelopes are unique, being the only Bovid with four horns and are the last survivors of a form very similar to that of the ancestors of the entire sub-family. They are primitive in both physical and behavioral characteristics. The absence of rings on horns which are keeled in the front distinguish them from the true antelopes (Meghwal et al. 2016; Swamy, et al. 2016). They have a pair of well-developed glands between the false hooves of the hind legs, but their use is unknown. The secretions from the glands in front of the eyes are used for marking. Preferring browsing to grazing, they require specific vegetation composition for foraging comprising chiefly of fruit/flower bearing plants. The four-horned antelope is a selective browser that can also be given a separate class of a ‘nibbler’ (Rahmani 2001; Sharma 2003; Jones 2009). Usually solitary in nature, they are also found in small groups of 2 to 3 individuals. They prefer hiding and taking refuge to fleeing and it is this tendency of the animal that explains to an extent their extensive use of forested areas and thickets within open savannahs (Meghwal et al. 2016; Swamy et al. 2016). They are also known to frequent water and are never seen far from it. The four-horned

Abstract: The Four-horned antelope (*Tetracerus quadricornis* Blainville, 1816) is endemic to the Indian Subcontinent and is classified as ‘Vulnerable’ (C2a (i)) in the IUCN Redlist. Within the country, the species is protected under Schedule-I of the Wildlife Protection Act (1972) of India, where about 95% of its global population is known to occur. However, the current distributional patterns of this low-density species are largely unknown and conservation efforts are hampered by the lack of information on species–habitat relationships. Our study was carried out by grid based approach, recce samplings and camera traps were followed to find out the distribution pattern and habitat use of the species, in the Bhaisanghat range of the Kanha National Park Madhya Pradesh, India. The results were expected to provide information on aspects of distribution and habitat use that would aid in the preparation of a habitat management plan for the area.

Keywords: Kanha National Park, Four – horned Antelope, Habitat use, Distribution
Antelope defecates on middens and visits them with variable frequencies. ‘Middens’ are points of communicating age/sex/territory and sexual status (oestrus) and when encountered, necessitate defecation and are used by both adults and fawns (Sharma et al. 2006). Defecation and urination on middens, and marking by pre-orbital glands are the two evident modes of maintaining territories. Gestation period is of eight and a half months and usually one or two young are born (Plate 4 and 5). Fawns are barely able to walk for a few days after birth and are kept hidden. Considering its uniqueness and endemism in Indian sub-continent, more scientific research is required on this animal with emphasis on its evolution, behavior, mortality, population viability, habitat selection and relationship with sympatric species (Rahmani 2001; Sharma 2003).

The current study is focused on distribution and habitat use of four-horned antelope of the protected area in Kanha National Park. Kanha is one of the richest wildlife diversity areas in India. In Kanha most of the present grasslands are of anthropogenic origin. Over the period of time, it was found that woody species in the vicinity have been invading inside the grasslands. This competition of grassland and woody species is ultimately resulting in the conservation of grasslands into woody habitat, thereby reducing the habitat for herbivores depending on grassland species and lack of information on species–habitat relationships Therefore, studying and quantifying this distribution and habitat use of herbivores species of Kanha National Park is of critical importance.

II. MATERIALS AND METHODS

STUDY AREA

Kanha National Park, part of Deccan peninsula–Central High-lands Biogeographic zone (Roders and Panwar 1988), spread across Mandla and Balaghat districts of Madhya Pradesh (MP) – covers an area of around 940 km², spread across 80°20’-81°05’E and 22°05’-22°25’N. The park area comprises mosaic of meadow and forest in the plain, extensive grasslands on the plateaus, and forest in the rolling hills (Kanoje 2006). According to Champion and Seth (1968), the forest type of Kanha National Park mainly consists of moist peninsular sal forest: (forest type 3C/C2a), southern tropical moist deciduous forest: (forest type 3A/C2a) and southern tropical dry mixed deciduous forest (forest type 5A/C3). The forest is typically represent and dominated by Shorea robusta, Terminalia chebula, Terminalia tomentosa and Bamboo mixed forest, etc.

In Kanha National Park have 6 ranges, Bhaisanghat range is one of them. The Bhaisanghat range area is about 17311.909 hac. and divided in to 5 circle and 23 beats for the proper management of the area. It is located in the Balaghat District of Madhya Pradesh in central India (Negi and Sukla 2011).

The study area was overlaid with a 2 x 2 km grid layer (Krishna et al. 2009). A total of 74 grids were laid covering with three vegetations viz: open grassland habitat, sal forest and Bamboo mixed forest. In grid 23 transect length of 2 km was laid and were systematically monitored for the one month’s (Map 1). Additionally camera trap (93 Camera traps Map-2) and recce sampling (Swapna et al. 2008) was also adopted to find the distribution patterns of the species due to the animals are shy in nature. Further information on the group size, age class and sex was also collected to understand the composition of four-horned antelope in the Bhaisanghat range of Kanha National Park. Direct sightings (Plate. 3) GPS coordinates were taken for plotting on the map (Map 2).
Grass height was estimated wherever a direct sighting was obtained. With the help of a bamboo stick with six sections etched on it, grass height was measured as one of the following six categories: Very Low (0<to<10 cm), Low (10<to<25 cm), Low medium (25< to<45 cm), Medium (45<to<75 cm), Tall medium (75< to<1 m) and Tall (>1 m) (Plate 7 and 8).

III. RESULT AND DISCUSSION

Habitat studies provide crucial information about the ecological requirements of a species or community. Habitats of animals have been studied for long. From the initial days of Aristotle (344 B.C.) where man learnt about habitat use by animals due to innate curiosity to today’s times when understanding ecological relationships (Merriam 1890; Adams 1908; Svardson 1949), conservation of natural resources (Soule 1986) and management of areas with specific requirements (Fox et.al. 1988; Rahmani 1989) have made it mandatory to understand habitat requirements of different species. Increasing habitat loss causes a significant increase in extinction risk among many species, especially habitat specialists (Rahmani 1989; Birdlife International 2001; Norris and Harper 2003; Mallon 2003). While it is important to assess the habitat usage, it is equally important to conduct studies addressing the pattern of usage.

A Total of 74 grids were surveyed among which only 8 individual was found on the transect number (KTR 104, 106, 107, 108) in year 2017 this transect falls in the open grassland with scatted trees habitat. Out of 23 beats, the Chousingha was found to inhabit only in 14 beats, namely: Adwar, Balda, Dudhaniya, Jholar, Kadla, Bhursadadar, Devridadar, Gadaghat, Ajapur, Phoolwari, Katoldih, Kamodidadar ,Rounda and Sukdi . The encounter rate for signs/sightly was high in open habitat and it was much lower in the fairly dense forests. Maximum direct sighting were in the months of April, May, June and mid July as these being the summer months, the vegetation was sparse. Very few sighting was registered in rainy season. This was only due to the overgrowth of vegetation that hindered the direct sighting and concomitantly the washing out of the indirect evidences through flowing rain water. However, it is a common hindrance usually occurs while studying wildlife population dynamics in jungle areas (Manchiryala et al. 2015). The mean group size was 1.26 (range 1 to 2 individuals), its indicating that this is largely a solitary or semi-solitary species.

The above observation revels that the four horned Antelope were sparsely distributed in the study area. The number of animals sighted on transects the most common species were Gaur, Barahsingha, Langur, Barking deer, Chital, Samber and wild boar (Figure 1).

Animal behavior is an important component of conservation biology (Berger Tal et al. 2011) and, hence, is of considerable interest to researchers and wildlife managers. There shy nature and small size make sighting difficult (Baskaren et al. 2009 and Swamy et al. 2016). Camera traps are used as an efficient method to insure continuous sampling and to work in difficult to access areas. Total 93 Camera trap used in the Bhaisanghat range which evidenced 16 individual was recorded in 8 camera traps on the number 16, 17, 21, 24, 27, 44 54 and 56. When using direct sightings or evidence of presence of animals in a particular area, one has to remember that they might be using a particular habitat just for transit between two optimal habitat types (Boitani and Fuller 2000). It is equally important for habitat studies to circumvent the problem of obtaining spurious inferences due to insufficient information about the pattern of use.

Figure 1: Direct sightings of various species recorded on transects

Figure 2: Percent sightings of Four-horned antelope within various grass heights

Four-horned antelopes are small antelopes and like other similar-size ungulates, have high metabolic requirements (Kleiber 1961; Jarman 1974; Brashares et. al. 2000). Since their food intake capacity is limited, unlike large ungulates, Four-horned antelopes cannot take coarse and fibrous food material in large quantities. They require high protein diet and are therefore largely dependent on fruits, flowers, pods and fresh browse. Available habitats fluctuate over diel and seasonal periods, which can influence distribution and abundance of species (Yu and Peters 2002). Phenology of vegetation in Bhaisanghat range (KTR) indicates that except for the monsoon, there is a continuous availability of fruits, flowers and pods for animal’s rest of the year. For such continuous availability of high protein diet, it is important to have a high diversity of fruiting vegetation in the area. The floral diversity of fruiting vegetation provides haven to the Four-horned antelope and ensures food availability throughout the year. The only season when little or no such food is
available to the Four-horned antelope is the monsoon, but fresh nutritive browse is available in abundance to meet its food requirements. Predation has an important influence on the spatial distribution of animals through its effects on avoidance behaviour of prey. Formation of herds and flocks is a common response to predation risk by animals occupying open habitats (Hobson 1978). Alternatively, animals can disperse in highly structured habitats that reduce the capacity of predators to detect or pursue their prey (Lima and Dill 1990). Further analysis of data on grass height reveals that Four-horned antelopes use areas with medium (45-75 cm) to tall-medium (75-100 cm) grasses. An increasing trend of use towards taller grasses was observed up to medium grass height. The Four-horned antelope was rarely found in tall-medium and tall (>100 cm) grasses (Figure 2). This pattern can be explained with the help of its anti-predatory and vigilance behaviour. Four-horned antelopes have a distinct anti-predatory strategy where they freeze and keep an eye at the threat rather than taking to evasive action and use vegetation cover to hide from potential predators. Since the average height of a Four-horned antelope is 55 to 60 cm, it is difficult for it to see through grass taller than 1 m. It is understood that with low grass height, the visibility increases considerably and the Four-horned antelope’s anti-predatory strategies are compromised. Similarly in grasses that are too tall, it must be difficult for the Four-horned antelope to keep an eye at the threat. It is possibly because of these reasons that the Four-horned antelopes thrive well in areas of moderate grass height.

Table 1 shows the various microhabitats in the Range where the animals were sighted.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Microhabitat type</th>
<th>Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open Grassland Habitat</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Sal forest</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Bamboo mixed forest</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Near human colonization</td>
<td>0</td>
</tr>
</tbody>
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Table 1: Microhabitat preference of Four-horned Antelope in Bhaisanghat range (Kanha National Park)

Data clearly indicates that the most preferred site of Chowsingha was the open areas existing between the hills. It was observed that during confrontation with the animal, it sought the nearest tree and hid behind it. If the distance between observer and animal was larger, it just sprinted up the hill and become out of sight. It was also noticed that the antelopes are not distributed in such areas where anthropogenic pressure are higher.

Chowsingha prefers the thorn-mixed forest found in a hilly terrain (Prater 1980; Sharma et al. 2009; Baskaran et al., 2009). In our study all the four blocks where we found directly or indirectly the traces of Chowsingha were rich in thorny shrubs and trees. Some of the noticeable floral species were Emblica officinalis, Dendrocalamus strictus, Madhuca longifolia, Syzygium cumini, Terminalia tomentosa, Diospyros melanoxylon, Mitragyna parvifolia, Lagerstroemia parviflora, Randia clmentorum, Lantana camara, Cassia fistula etc. These blocks also have covered by grass species like Dicanthium annulatum, Apluda mutica, Heteropogon contortus, Themeda quadrivalvis, Setaria glauca etc. which altogether offers a suitable habitat for Chowsingha. They seem to avoid area where there is dense growth of Lantana camara and they avoid areas frequented by humans.

Plate 1: An Adult Male

Plate 2: An Adult Female

Plate 3: Male and Female chowsingha (Tetracerus quadricornis) associate irregularly and are seen together most often during rut in june-july
Plate 4: An Adult Female and fawn

Plate 5: Use of camera trap image—an adult female with two fawn

Plate 6: Use of camera trap image—an adult male

Plate 7: Male chowsingha in typical habitat

Plate 8: Open grassland habitat during mansoon

IV. CONCLUSION

As is evident from the map, north side outer boundary of the Bhaisanghat range is densely surrounded by the villages. The locations where we estimated the presence of more Chowsingha are considerably far from human colonization. It was also predicted by Baskaran (2009) that the distribution of Chowsinghais adversely affected by human disturbance.

Large number of Chowsingha sightings pertains to open areas between hills which seem to be the most preferred habitat in our study. This habitat represents by short grass and more open canopy (below 0.4) as compared to the other area. This habitat seems to be ideal for Chowsingha for better visibility to detect and escape predators.

ACKNOWLEDGEMENT

The authors are gratefully acknowledging Dr. Rakesh Sukla Research officer of Kanha National Park for their valuable inputs to construct the manuscript. The Author also thankful to Mr. Gireesh Bandewar to technical support of manuscript.
REFERENCES


