

Fecal Pellets used for the Determination of Habitat Utilization of Sambar (*Rusa unicolor niger*) in Van Vihar National Park, Bhopal, Madhya Pradesh, India

MUZAFFAR AHMAD WANI, SANJAY TELANG,
SAHEEL AHMAD BHAT and KHURSHEED AHMAD SHEIKH

Department of Zoology, Government Science and Commerce College, Benazir, Bhopal (India).

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ABSTRACT

The sambar (*Rusa unicolor*) is the largest and most widely distributed deer in India. Between July 2010 and June 2011, habitat utilization of sambar, using fecal pellet method was studied in VanVihar National Park, Bhopal, Madhya Pradesh, India. Sambar utilized different habitats in different seasons. Grassland and savanna habitats were overutilized in monsoon and post-monsoon while as wetland and woodland habitats were underutilized. In winter season, scrubland and grassland habitats were overutilized while as wetland habitats were underutilized. In summer season woodland and scrubland habitats were overutilized while as grassland, wetland and savanna habitats were underutilized by the sambar deer.

Key words: sambar, Van Vihar National Park, habitat, ungulate, transect line, range finder.

INTRODUCTION

Sambar is the largest and most widely distributed among eight species of Cervids in India. No large Indian ungulate has adapted itself to a wider variety of forest types and environmental conditions than has sambar (Schaller 1967). Within India, sambar occurs in the thorn and arid forest of Gujarat and Rajasthan, in the moist and dry deciduous forests throughout peninsular India, in the pine and oak forests at the Himalayan foot hills, and in the evergreen and semi-evergreen forests of Northeastern India and Western Ghats. In Asia, sambar has a wide geographical distribution from the Philippine Islands in the east, through Indonesia, Southern China, Indochina, Thailand and Burma to India in the west. Sixteen subspecies of sambar are recognized of which *Rusa unicolor niger* is found in India. Although the sambar is a widespread forest dweller of Southern Asia, its ecology and behaviour has not been much investigated. The only accounts available are those of Schaller (1967), Krishnan (1977), Johnsingh (1983) and Ngampongsai (1987).

Study Area

VanVihar National Park (23.23° N) and 77.36° E) is situated in the heart of Bhopal city of Madhya Pradesh. The total area of VanVihar National Park is 445.21 hectares (4.45 km²). The VanVihar National Park is situated on the fringe of Upper Lake, which is a Ramsar site and the lifeline of capital city of Madhya Pradesh. The climate of the area is subtropical characterized by monsoon (July to August), post-monsoon (September to October), winter (November to February) and summer (March to June). In winter the average temperature is around 18-20°C and it drops to as low as 7°C in the month of January. The summer months are very hot and humid with an average temperature of about 35-40°C and it reaches to as high as 47°C especially in the months of May and June. The average rainfall is around 1266 mm. According to Champion and Seth's classification, this area comes under the Southern dry deciduous scrub forest with dry deciduous species. The main species include Bel (*Eagle marmalos*), Amaltas (*Cassia fistula*), Babul (*Acacia nelotica*), Reunjha (*Acacia leucophloea*), Doodhi (*Wrightia tinctoria*), Lendia (*Lagerstroemia*

parviflora), Saja (*Terminalia tomentosa*), Amla (*Embllica officinalis*) and Tendu (*Diaspyros melanoxylon*). The wild ungulate community of VanVihar National Park comprises of sambar (*Rusa unicolor*), chital (*Axis axis*), nilgai (*Boselaphus tragocamelus*), black buck (*Antelope cervicapra*), chinkara (*Gazella gazella*), chousingha (*Tetracerus quadricornis*) and wild boar (*Sus scrofa*).

Study Methods

On the basis of vegetation, the study area was divided into five major habitats viz grasslands, woodlands, savannas, scrublands and wetlands. Our basic data comes from 10 straight line transects established in a parallel manner in the study area. The transect lines marked with paint were established in such a manner that each transect line passes through all the habitats of the National Park. Each transect line was divided into a number of identical segments and on each segment a number of plots of equal lengths and widths were marked on both sides of the transect line. All the transect lines were covered on foot during the observation periods. Each transect line was walked twice by the observer in each major season of the year and in this way a total of 60 fecal pellet observations were obtained in a research period of one year from July 2010 to June 2011. While walking on a transect line, fecal pellets present in the plots marked on both sides of the segments of a transect line were identified, counted and then finally removed away from the plots. The plots from which maximum fecal pellets were collected while walking on a transect line in any season would indirectly help the observer in determining the habitats mostly preferred by the sambar in that particular season of the year.

RESULTS AND DISCUSSION

A total of 60 fecal pellet observations were obtained on the habitat utilization of sambar and it was observed that sambar prefers to inhabit different habitats in different seasons in VanVihar National Park. In the months of monsoon and post-monsoon, sambar mostly preferred to inhabit the grassland habitats with 48.95 percent mean percentage of animals followed respectively by savannas with 27.65 percent, scrublands with 12.4 percent, wetlands with 7.6 percent and woodlands

Table 1: Habitat utilization of sambar in different habitats of VanVihar National Park from July 2010 to June 2011

Season of the year	Total no. of observations	Mean percentage of animals in				
		grasslands	savannas	woodlands	scrublands	wetlands
monsoon & post- monsoon	20	48.95	27.65	3.4	12.4	7.6
winter	20	22.59	18.27	18.14	33.34	7.66
summer	20	10.42	10.31	40.90	28.39	9.98

with 3.4 percent mean percentage of animals (Table 1, Fig.1). The observations clearly showed that in the months of monsoon and post-monsoon grassland and savanna habitats were overutilized, while as wetland and woodland habitats were underutilized by the sambar in the months of summer season.

In the months of winter season, sambar mostly preferred to inhabit the scrubland habitats with 33.34 percent mean percentage of animals followed respectively by grassland habitats with 22.59 percent, savannas with 18.27 percent, woodlands with 18.14 percent and wetlands with 7.66 percent mean percentage of animals (Table 1, Fig.1). The observations clearly showed that in the months of winter season, scrubland and grassland habitats were overutilized while as wetland habitats were underutilized by the sambar in the months of summer season.

In the months of summer season, sambar mostly preferred to inhabit the woodland habitats with 40.90 percent mean percentage of animals followed respectively by scrublands with 28.39 percent, grasslands with 10.47 percent, and savannas with 10.31 percent and wetlands with 9.98 percent mean percentage of animals (Table 1, Fig.1). The observations obtained in the

months of summer season clearly showed that woodland and scrubland habitats were overutilized while as grassland, savanna and wetland habitats were underutilized by the sambar in the months of summer season.

Grassland and savanna habitats were overutilized in the months of monsoon and post-monsoon, because in these months these habitats usually are covered with a large number of green grasses and herbs, which act as the main dietary component of sambar in these months. Another reason for the overutilization of grassland and savanna habitats is that in these months females gave birth to their young ones and because of the danger of predators, they hide their young ones in the tall grasses which are mainly present in abundance in these habitats and in this way protect their young ones from the predators like dholes, jackals and crocodiles.

Scrubland habitats were overutilized in the months of winter season because in these months sambar in addition to grazing on grasses and herbs switches over to browse and also feeds on the fallen leaves, flowers and fruits of some preferred food plants like *Capparis sepiaria*, *Grewia flavescens* and *Anogeissus pendula* etc. which are mostly present in the scrubland habitats.

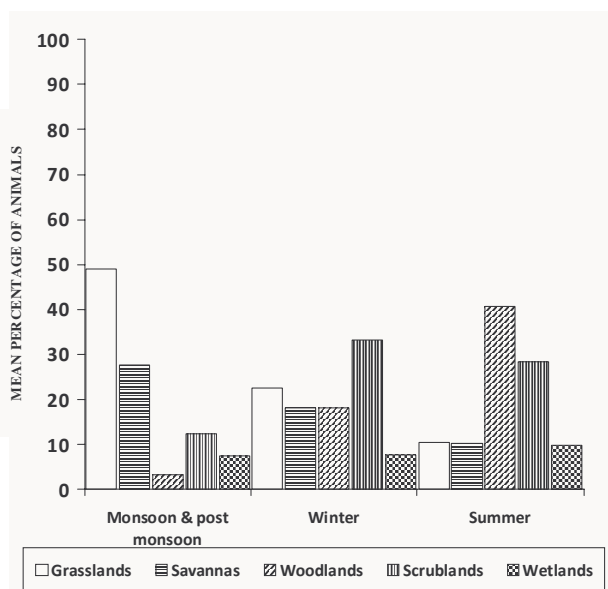


Fig. 1: The proportion of sambar in different habitats of VanVihar National Park from July 2010 to June 2011

Woodland habitats were overutilized in the months of summer season, because in these months green grasses and herbs become scarce and sambar mainly feeds on the fallen leaves and fruits of some preferred food plants like *Zizyphus mauritiana*, *Butea monosperma*, *Zizyphus mummularia* and *Phoenix sylvestris* etc which are mostly present in the woodland habitats. Another reason for the overutilization of woodland habitats is that these habitats usually are dominated by trees whose canopies generally overlap and interlink often forming a more or less continuous canopy which sheds the ground to varying degrees and because of the hot and humid conditions prevailing in the months of summer season, sambar mostly in day time rests under the shades of these trees and

in this way protect themselves from the harmful environmental conditions.

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REFERENCES

1. Bagchi, S., S.P. Goyal and K. Sankar., Niche relationships of an ungulate assemblage in a dry tropical forest, *Journal of Mammalogy* **84**: 981-988 (2003).
2. Burnham, K.P., D.R. Anderson and J.L. Laake., Estimation of density from line transect sampling of biological population, *Wildlife Monographs* **72**: 1-202 (1980).
3. Champion, F.W. & S. K. Seth., *A Revised Survey of the Forest Types of India*. Manager, Government of India Press, Nasik 1968.
4. Eisenberg, J.F. and M. Lockhart., An ecological reconnaissance of Wilpattu National Park, Ceylon. *Smithsonian Contributions to Zoology* 101. Washington, DC (1972).
5. Ganesh Prassana, A.J., Ecology of sambar (*Rusa unicolor*) at Mudumalai Wildlife Sanctuary. M.Sc. dissertation, Loyola College, University of Madras (1990).
6. Jarman, P.J. and A.R.E. Sinclair., Feeding strategy and the pattern of resource partitioning in ungulates. In: A.R.E. Sinclair & M. Northern – Griffiths, *Eds. Serengeti: Dynamics of an Ecosystem*. The University of Chicago Press, Chicago, 389 Pp (1979).
7. Johnsingh, A.J.T., Large mammalian prey-predators in Bandipur. *Journal of the Bombay Natural History Society* **80**: 1-49 (1983).
8. Karanth, K.U and M.E. Sunquist., Population structure, density and biomass of large herbivores in the tropical forest of Nagarahole, India. *Journal of Tropical Ecology* **8**: 21-35 1992.
9. Krishnan, M., An ecological survey of the larger mammals of peninsular India. *Journal of the Bombay Natural History Society* **67**: 496-501 (1972).
10. Ngampongsai, C., Habitat use by the sambar (*Rusa unicolor*) in Thailand—a case study for Khao-Yai National Park. Pages 289-298 in *Biology and management of the Cervidae* (C. M. Wemmer, ed.). Smithsonian Institution Press, Washington, D.C (1987).
11. Richardson, W.A., A natural history survey of sambar deer (*Rusa unicolor*) on the Powderhorn, Ranch, Calhoun country, Texas. M.Sc. Thesis, Texas A&M University, Texas, 76 Pp (1972).
12. Sankar, K., Ecology of three large sympatric ungulates (chital, sambar and nilgai) with special reference to reserve management. Ph.D. Thesis, University of Rajasthan, Jaipur, India, 190 Pp (1994).
13. Schaller, G.B., *The deer and tiger - A study of wildlife in India*. University of Chicago Press, Chicago, Illinois (1967).
14. Varman, K.S., and R. Sukumar. Ecology of sambar in Mudumalai Sanctuary, Southern India. Pp. 273-284 in *Deer in China: Biology and Management* (N. Ohtaishi and H-L. Sheng, eds.). Elsevier Science Publishers, Amsterdam, The Netherlands (1993).