Habitat Utilization of Chital (*Axis axis axis*) in Van Vihar National Park, Bhopal, Madhya Pradesh, Central India

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

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

ABSTRACT

Between June 2010 and June 2011, the habitat utilization of chital (*Axis axis axis*) were studied in Vanvihar National Park, Bhopal, M.P. Chital used different habitats in different seasons of the year. In monsoon, scrubland was highly preferred by chital followed by grassland. In winter, still the most preferred habitat used by chital was scrubland. In summer, the most preferred habitat was woodland followed by scrubland and grassland. Therefore in monsoon and winter, the scrubland and grassland were overutilized and woodlands, savannas and marshes were underutilized. In summer, woodland was overutilized, while as scrubland, grassland etc were underutilized.

Key words: *Axis axis axis*, Habitat utilization, Scrubland,
Grassland, Savannas, Woodland, Marshes, National park.

INTRODUCTION

Vanvihar National Park in Bhopal city (Madhya Pradesh, Central India) harbours a rich diversity of animal and plant life. It is an important remnant of the humid subtropical climate. A substantial population of chital, sambar, nilgai. wildboar, Jackel, blackbuck, black bear, Python, lion, tiger etc inhabit Vanvihar National Park. I have been making observations about habitat use by chital since June 2010 to May 2011. Chital is essentially a species of the ecotone between forest and grassland or open lands bordered by shrub, which provides a combination of forage and cover (Johnsingh 1980). Chital are always associated with grassy forest glades. The species seldom lives under dense cover, preferring the fringes of the forest (Prater 1971). Chital is mainly an animal of more open forests where deciduous tree cover alternates with grass lands and belts of scrub. In this paper, I present results on habitat utilization of chital (June 2010-May 2011). This research, I believe will be fruitful in formulating scientific management strategies.

Study area
Location and Area

Vanvihar National Park is a national park in India situated in the heart of Bhopal, the capital city of Madhya Pradesh (23.23 °N and 77.36 °E). Declared as a National Park in 1983, it covers an area of about 4.45 km². Although it has the status of a national park, Vanvihar is developed and managed as a modern zoologist park, following the guidelines of the Central Zoo Authority (CZA).

History

About two decades back, a number of illegal stone quarries were operational in the Area and being in the serene and beautiful location on the bank of big lake, many commercial organizations were trying to take hold of this valuable piece of land. Realizing importance of both in-situ and ex-situ conservation of wild fauna, it was decided to provide this area a legal umbrella under the wildlife (protection) Act, 1972. A committee of experts was constituted to decide the modalities for constitution of this area as a protected area. An area of 4.4521 km² of land was notified as national

park in the year 1983 as per the committee's recommendation. Efforts of protection and habitat improvement measures resulted in its enrichment in a very short period of time.

Geography

The park is situated on the fringe of upper lake, which is the Ramsar site and the lifeline of the capital city of Madhya Pradesh. The lake adds immense beauty to the landscape of Vanvihar. It is situated at the foot of the Shyamla hill, which is one of the several hills constituting the geography of Bhopal.

Climate

The region has a humid subtropical climate with mild dry winters, a hot summer and a humid monsoon season. Summers start in March and go on till June. The average temperature being around 30°C (86°F), with the peak of summer in May, when the mercury regularly exceeds 40°C (104°F). The summers are usually dry with little or no precipitation. The average rainfall in summer is around 16 mm. The monsoon starts in mid June and ends in late September. The south-west monsoon reaches the city around mid June and brings frequent spells till late September. These months see about 1020 mm of precipitation, frequent thunder storms and flooding. The average temperature is around 25°C (77°F) and the humidity is quite high. The winter starts from early October and lasts up to late February. Winters in the region are mild, sunny and dry with average temperature around 18°C (64 °F) and little rain. The average rainfall in winter is around 50 mm.

Habitat

The park can be divided into five broad habitats based on canopy and dominant plant species.

Grasslands

The grasslands are characterized by open areas where grasses like *Dendrocalamus strictus*, *Acrocera zizanioides*, *Saccharum spontaneum* are the dominant vegetation with very few trees such as *Pheonix sylvestris*, *Madhuca indica*, etc.

Savannas

Savannas are areas of open grass lands with very few trees even lesser than grasslands. The grasses such as *Panium spp.*, *Echinochloa colona*, *Paspalidium germinatum,* etc are dominant vegetation.

Scrubland

Scrubs in the study area are characterized by trees which are slightly higher in number than savannas with little or no ground vegetation. scrub vegetation is xerophytic, which means "dryness loving" and is adopted to absorb maximum sunlight. *Albizia procera* and *Wrightia tictoria* etc are dominant plants in scrubland.

Marshes

Marshes are wetlands frequently or continually inundated with water, characterized by emergent soft stemmed vegetation adopted to saturated soil conditions. Marshes receive most of their water from surface water and are fed by waters of upper lake. *Terminalia tomentosa*, *Brachiaria refetans*, *Hemidesmus indicus*, *Linderbergia urticaefolia* etc are dominant plants.

Woodlands

Woodlands are comprised of deciduous trees, woody shrubs and ground cover vegetation such as ferns, mosses and lichens. It is dominant in trees like *Mitragyna parviflora*, *Ficus glamarata* etc.

METHODS

The transect line method is used to determine the habitat utilization of chital. In this method, lines are placed at random in the survey region or more commonly a set of equally placed parallel lines were randomly superimposed on the study area. The observer walks along each line, recording any animals detected with in a distance 'w' of the line together with their shortest distance from the line (Buckland et al 2001). In some cases, the distance of detected animals from the observer (so called radial or animal to observer distance) together with the angle from the angle of detection are recorded from which the perpendicular distance from the line is calculated later using simple trigonometry. The perpendicular distances are used to estimate a detection function, which is the probability that an animal is detected as a function of distance from the line. For the basic method, it is

assumed that this probability is one at zero distance from the line i.e., animals on the line are seen with certainty. Given an estimate of the detection function, the observer estimated the proportion of animals detected with in a strip extending a distance 'w' from the line on either side. This allows the observe to estimate the density of animals in a given habitat by adjusting encounter rates i.e., number of animals detected per unit length of line. Many animals such as chital tend to occur in groups termed clusters in the distance sampling literature. The whole study area was divided into 26 transect lines for the determination of habitat use of chital. Each transect line was walked once in every season. For one day only one transect line was walked.

RESULTS AND DISCUSSION

In the month of June, 62 percent animals used scrubland, 18 percent used grassland, 12 percent used woodland, 4 percent used savannas and 4 percent used marshes of the study area.

In the month of July, 66 percent animals used scrubland, 18 percent used grassland, 8 percent used woodland, 4 percent used savannas and 4 percent used marshes of the park.

In the months of August and September, 60 percent animals used scrubland, 20 percent used grassland, 8 percent used woodland, 6 percent used savannas and 6 percent used marshes of the park.

Therefore in monsoon, 62 percent animals used scrubland, 19 percent used grassland, 9 percent used woodland, 5 percent used savannas and 5 percent used marshes of the park. Thus in monsoon, scrubland and grassland were overutilized while as woodland, savannas and marshes were underutilized relative to the available area (Fig. 1). The animals were mainly feeding in the grasslands during dusk and dawn and rests under the shade of large trees in scrubland during the rest of the day to avoid the heat of sun. In this season the animals were found much away from the water holes of the park.

In the month of October, 49 percent animals used scrubland, 20 percent used grassland, 16 percent used woodland, 9 percent used savannas and 6 percent animals used marshes of the study area.
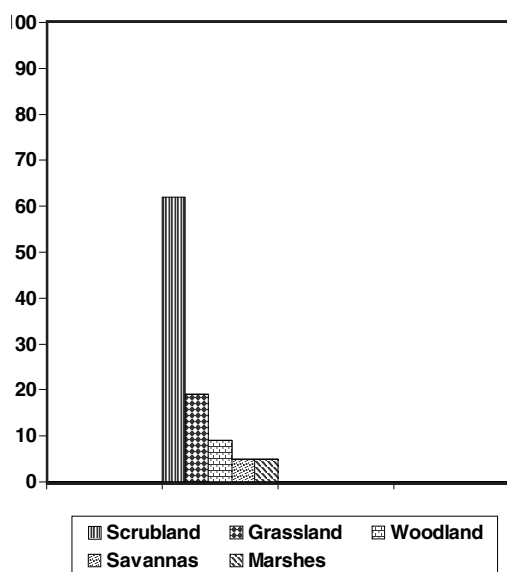
In the months of November and

Fig 1: The Proportions of chital during monsoon in all five habitat types (June-Sep 2010)
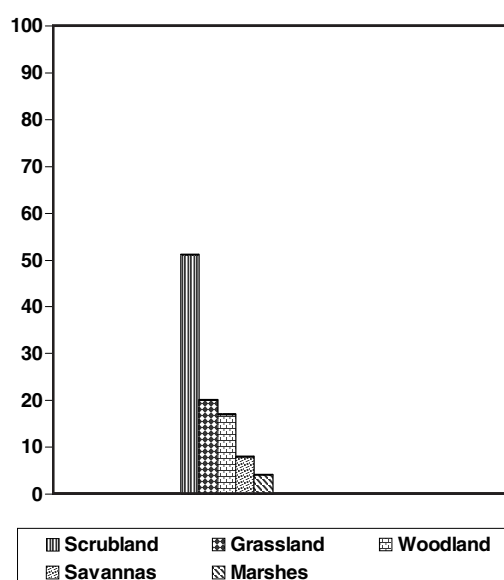

Fig. 2: The proportions of chital during winter in all five habitat types (Oct 2010-Feb 2011)

December, 51 percent animals used scrubland, 22 percent used grassland ,18 percent used woodland, 6 percent used savannas and 3 percent used marshes of the park .

In the months of January and February, 52 percent animals used scrubland, 19 percent animals used grassland, 17 percent used woodland, 8 percent used savannas and 4 percent animals used marshes.

Therefore in winter, 51 percent animals used scrubland, 20 percent used grassland, 17 percent used woodland, 8 percent used savannas and 4 percent animals used marshes of the park. In winter, still the most preferred habitat was scrubland and grassland and thus scrubland and grassland were overutilized and woodland, savannas and marshes were underutilized (Fig. 2). But slowly the animals had shown movement towards woodlands in this season to browse on the leaves, flowers and fruits of trees due to scarcity of grasses.

In the month of March, 26 percent animals used scrubland, 11 percent used grassland, 53 percent used woodland, 6 percent used savannas and 4 percent animals used marshes of the park.
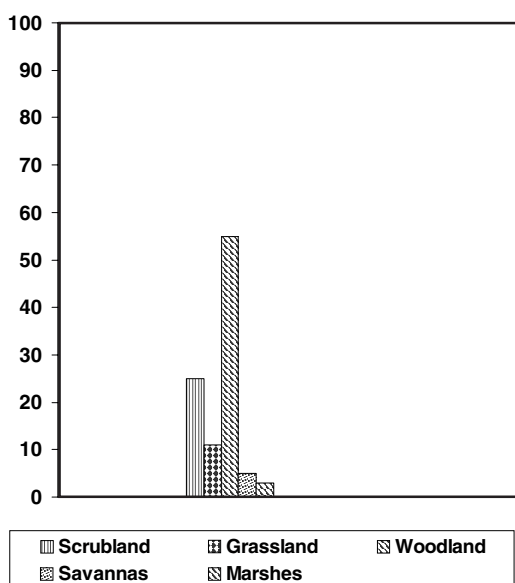
In the month of April, 24 percent animals used scrubland, 10 percent used grassland, 58 percent used woodland, 5 percent used savannas and 3 percent animals used marshes of the park.

In the month of May, 27 percent animals used scrubland, 12 percent used grassland, 55 percent used woodland, 3 percent used savannas and 3 percent used marshes of the park.

Thus in summer, 26 percent animals used scrubland, 11 percent used grassland, 55 percent woodland, 5 percent used savannas and 3 percent animals used marshes of the park.

In summer, therefore the most preferred habitat used by chital was woodland followed by scrubland and grassland. Hence the woodland was overutilized and scrubland and grassland were underutilized relative to the available area (Fig. 3). In this season, the majority of animals had moved to the woodlands to fed on the leaves, flowers and fruits of trees because nearly all the grasses, herbs etc in the grasslands became scarce due to the scorching heat of sun. The other reason for their movement was to avoid the rising temperature. In this season, the animals were found very close to the water holes of the park.

Chital generally avoids dense forests. It prefers open forests where deciduous tree cover alternates with grasslands and belts of scrub. In dense forest, they occur in small parties. In dry thorny littoral scrub, chital degenerate in size and forage in parties rather than herds as in Guindy Park and Point Calimere (Krishan 1977). Large herds of chital are encountered in areas comparatively open mainly grassland and scrub. Need of shade influences the distribution of chital (Schaller 1967). Chital was observed to occupy good quality open woodland in Sariska Tiger Reserve (Rodgers 1984). Chital are abundant in the terai region characterized by grassy meadows and savannah vegetation (Saharia 1982).

The central meadows amidst sal forest in Kanha National Park abounds in spotted deer (Panwar 1973). The riverain forests and grasslands occurring intermixed in the Royal Chitawan National Park, Nepal have a high edge effect and

Fig. 3: The proportions of chital during summer in all five habitat types (March-May 2011)

Legend: ⦙⦙⦙ **Scrubland**   ⊞ **Grassland**   ⧄ **Woodland**   ⊡ **Savannas**   ⧅ **Marshes**

were ideal for wild ungulates including chital (Sunquist 1979). Grassland intermixed with shrubs and woodland constitutes the favoured habitat of the chital in the Royal Chitawan National Park (Dhungel 1982). In the flat, tree dotted grassy areas of the Keoladeo Ghana Sanctuary, chital is the most abundant wild ungulate (spillet et al 1966). Mujumdar (1955) noted the abundance of chital in Teak,bamboo forest of North Chanda with grassy openings, especially blocks like Kolsa, Karwa, Mohali, Junona and the Taroba National Park.

Chital avoid tall grasses (Johnsingh 1980). Open grassy areas are important for chital to congregate at night to reduce the possibility of tiger predation (Schaller 1967, Panwar 1979). Small patches of tall grasses, shrubs and thickets are used as hiding cover (Sharma 1981). Tall shady trees are used to rest under the heat of summer (Sawarkar 1978). Large trees in open areas, a shady stand of trees are important as thermal cover for chital in summer (Choudhary 1980 pers. comm.). Chital occupy the valley bottoms and relatively flat areas in Melghat (Shaikh, Sawarkar 1979).

REFERENCES

1. Balasubramaniam, S.,C.Santiapillai and M.R. Chambers., Seasonal shifts in the pattern of habitat utilization by the spotted deer (*Axis axis* erxleben, 1977) in the Ruhuna National Park, Srilanka. *Spixiana* **3**: 157-66 (1980).

2. Berwick, S.H. and P.A. Jordan., First report of the yale-Bombay Natural History Society studies of wild ruminants at the Gir Forest, Gujarat, India. *J. Bombay Nat. Hist. Soc.* **68(2)**: 412-23 (1971).

3. Bhat, S.D. and G.S. Rawat. Habitat use by chital (*Axis axis*) in Dhaulkhand, Rajaji National Park, India. *Tropical Ecology* **36(2)**: 177-89.

4. Chakrabarty, B., Habitat use by radio instrumented chital, sambar and nilgai in Sariska Tiger Reserve. M.Sc. Diss. Saurashtra University, Rajkot, India (1991).

5. Choudhary, K.C.R., Behaviour of chital (*Axis axis* Erxleben). *Jnl.Bombay Nat. Hist.Soc.* **63**:747 (1966).

6. Dinerstein, E., An ecological survey of the Royal Karnali-Bardia Wildlife Reserve, Nepal. Part II: habitat/animal interactions. *Biol.Conserv.***16**: 265-300 (1979).

7. Ellingwood, M.R. & S.L. Caturano., An evaluation of deer management options. Northeast Deer Technical Committee, Publ. No. DR-11.12 pages (1988).

8. Mekay, G.M. and J.F. Eisenberg., Movement patterns and habitat utilization of ungulates in Ceylon. Pages 708-21 (1974).

9. Moe, S.R. and P. Wegge., Spacing behaviour and habitat use of axis deer (*axis axis*) in lowland Nepal. *Can. Jnl. Zool.* **72**: 1735-44 (1994).

10. Nichols, L., Ecology of the axis deer. Job Completion Report. Project W-5-R-11. Hawaii Div. Fish & Game. *Mineo*-32 PP (1960).

11. Pillai, R.S., Wildlife Census with reference

to chital (spotted deer). *Bull Indian Mus*. **1(2)**: 55-58 (1966).

12. Rao, E.H., Chital or spotted deer. *Hornbill Bombay Nat. Hist. Soc*. **8**: 11 (1978).

13. Schaller, G.B., The Deer and the Tiger: a study of wildlife in India. Univ. Chicago press, Chicago, 370 PP (1967).

14. Seial, W., E.K. Bharucha and W.A. Rodgers., The use of Geographic Information systems (GIS) in identifying potential wildlife habitat. *J. Bombay Nat. Hist. Society.* **86**: 125-128 (1989).

15. Tak, P.C. and B.S. Lamba., Ecology and ethology of the spotted deer, *Axis axis axis (*Erxleben). Records of the zoological survey of India, occasional paper No. 43. 100 PP (1984).

16. Warning, G., Preliminary study of the behaviour and ecology of axis deer (*Axis axis*) of Maui, Hawaii.Research Report to Haleakala National Park and the National Park Service (1996).

17. Wehausen, J.D. and H.W. Elliott., Range relationships and demography of fallow and axis deer on Point Reyes National Seashore. *Calif. Fish & Game* **68(3)**:132-45 (1982).