



HABITAT PREFERENCE OF INDIAN BISON (*BOS GAURUS*) DURING SUMMER IN BILLIGIRI RANGASWAMY TEMPLE WILDLIFE SANCTUARY, KARNATAKA, INDIA

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ABSTRACT

The gaur (*Bos gaurus*) known as 'Indian bison' is found in different forest types. These include tropical wet evergreen, semi-evergreen, moist and dry deciduous forests. The study presented here is to see the habitat preference of bison between and within moist deciduous, dry deciduous and shola forests of BRT wildlife sanctuary, Karnataka during summer season. Though the dry deciduous forest was found to have the highest mean dung per quadrat (0.824 ± 0.93), but the animal does not show any preference towards the three studied forest types ($F = 1.28$, $df = 2358$, $P = 0.2806$). Preference was observed within the forest types where canopy cover is low, grass cover is high and shrub cover is low.

INTRODUCTION

The gaur *Bos gaurus* H. Smith (= *Bos frontalis*), also known as the 'Indian bison', is among the largest members of the family Bovidae. It is distributed in south and southeast Asia, from India to peninsular Malaysia, occurring in India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, China, Laos, Cambodia, Vietnam and Malaysia (Ellerman & Morrison-Scott 1951, Corbet & Hill 1992). Although the gaur has been described as essentially a hill animal (Prater 1980), it occurs widely in the plains wherever suitable habitat is available. In India, it occurs mainly in tropical wet evergreen and semi-evergreen forests. However, small areas of moist and dry deciduous forests also support a large number of them (Choudhury 2002).

As bison is found in different forest types, this study was carried out to see their habitat preference for three forest types (moist deciduous, dry deciduous and shola forests) of a protected area. Habitat preference studies for large herbivores generally support species conservation efforts and the process of prioritizing within a protected area as they play an important role in habitat management.

MATERIALS AND METHODS

The study was conducted in the Billigiri Rangaswamy Temple (BRT) wildlife sanctuary, Karnataka from 19 June to 25 June 2004. Located at the southern most boundary of the State ($11^{\circ}40'$ to $12^{\circ}9'N$ and $77^{\circ}05'$ to $77^{\circ}15'E$), the protected area (PA) covers an area of 540 sq. km. The PA is composed of varied types of vegetation which includes evergreen, riparian, semi-evergreen, moist deciduous, dry deciduous, shola, woodland to savanna woodland, scrub and grassland types of forests.

The main objective of the study was to see the habitat preference of bison between moist deciduous, dry deciduous and shola forests and also to see its preference for places within these habitats in BRT wildlife sanctuary during summer season.

Direct counting of the animal for the purpose within a limited time was difficult so dung-counting method was chosen for the study. There is strong correlation between estimates of dung counts and habitat use for ungulates, macropods and elephants (Barnes 2001). As bisons live in herd, so their

dungs are found aggregated in clusters covering a large area. Cluster sampling of fresh dung was done. For this method, a randomly found dung pile was taken as a base. Now taking that dung pile at the center, a 10m × 10m quadrat was laid around it. The total number of dung piles was counted inside that quadrat. Surrounding that 'base quadrat (B)' four new quadrats (say, P, Q, R and S) of similar size were laid around it touching all the four arms of the square in all four directions (Fig. 1). If any one of the latter quadrats (say P) had at least one number of dung or dung pile, then three more quadrats were laid around 'P' in the above-mentioned way, leaving the base quadrat (B), which is already counted. If a quadrat (say Q, R or S) did not contain any dung, then no further quadrat was laid around it.

And if all the four quadrats around the latest dung containing quadrat (N) did not have any dung, then one cluster was considered to be complete; and a fresh cluster was started keeping a new 'base quadrat'. Four clusters were sampled in each selected habitat type. Data were collected from 6 a.m. to 5 p.m. in all the habitat types.

In all the laid quadrats irrespective of presence or absence of dung(s), estimation of the canopy cover was done using a canopy meter. The percentage of grass cover and shrub cover was also estimated in each quadrat using ocular method.

One-way ANOVA was done to compare dung count per quadrat among the three habitats to see the habitat preference. As the data did not show a Gaussian distribution, so Spearman Rank correlation was done to correlate the number of the dungs and grass cover, shrub cover, and canopy cover to find out the habitat preference within a forest type. The data of percentage grass cover, shrub cover, and canopy cover were transformed to log value prior to correlation operation. Graph-Info and Excel software were used for the statistical applications.

RESULTS

Moist deciduous forest was found to have maximum number of fresh dungs (110) followed by shola forests (84) and dry deciduous forest (80). But, the mean dung density was found to be maximum in case of dry deciduous (0.824 ± 0.93) forest, followed by moist deciduous forest (0.8088 ± 0.99) and shola forests (0.656 ± 0.79) (Fig. 2).

However, one-way ANOVA done between the mean dung piles showed that there was no significant difference of habitat use ($F = 1.28$, $df = 2358$, $P = 0.2806$) among the moist deciduous, dry deciduous and shola forest types. It appears that bison has no habitat preference among the three forest types.

The correlation between dung counts with grass cover, shrub cover and the canopy cover revealed the results as shown in Table 1.

Thus, there is a strong positive correlation between dung counts and the grass cover, and negative correlation between dung counts and shrub cover as well as with canopy cover in all the forest types.

DISCUSSION

Different authors have different views about bison's occurrence. Wharton (1968) observed that it appears to avoid evergreen rainforest, preferring foothill tracts of sub-humid or deciduous forests adjacent to savanna forest, glades or other open terrain affected by Man and fire. Schaller (1967), while maintaining that gaur inhabits hilly terrain, cautions that such preference may be partly due to the earlier conversion of most of the plains. Conry (1989) identified open areas in low-lying river valleys as the best gaur habitat. Hubback (1937) was of the opinion that it is an animal of forest edge

Table 1: The correlation between dung counts with grass cover, shrub cover and the canopy cover

Sl. No.	Correlation between	Spearman 'r' value	'P' value	Inference
Moist deciduous forest:				
Sample Size (n) = 136				
1	Dung counts Vs Grass cover	0.4974	<0.0001	Highly Significant
2	Dung counts Vs Shrub cover	-0.6362	<0.0001	Highly Significant
3	Dung counts Vs Canopy cover	-0.02357	0.0155	Significant
Dry deciduous forest:				
Sample size (n) = 97				
1	Dung counts Vs Grass cover	0.3131	0.0042	Significant
2	Dung counts Vs Shrub cover	-0.4114	0.0001	Highly Significant
3	Dung counts Vs Canopy cover	-0.3098	0.0046	Significant
Shola forest:				
Sample Size (n) = 128				
1	Dung counts Vs Grass cover	0.4763	<0.0001	Highly Significant
2	Dung counts Vs Shrub cover	-0.3901	0.0002	Highly Significant
3	Dung counts Vs Canopy cover	-0.2455	0.0244	Significant

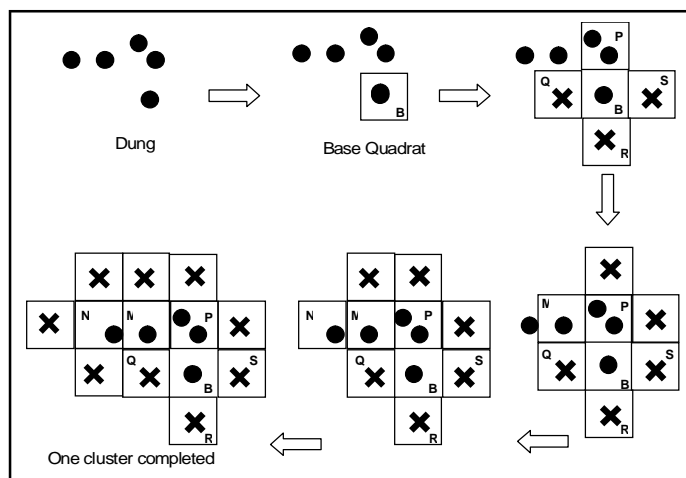


Fig.1: A schematic diagram showing the cluster sampling method.

and not virgin forest. Mineral licks are important haunts (Hubback 1937, Conry 1989), hence most local hunters setup camps near such sites. Hence, it is obvious that the animal occurs in varied types of habitats. This study reveals that Indian bison does not show any preference for moist deciduous, dry deciduous and shola forests that occur in BRT wildlife sanctuary.

Although the animal does not show any preference towards the three studied forest types during the summer season, but it tends to prefer some particular areas within each forest types. In case of moist deciduous forest, a strong positive correlation was observed between the dung count and grass cover, whereas a negative correlation was observed between dung count and the shrub cover, and

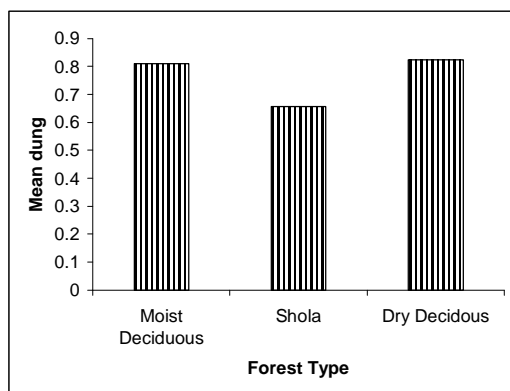


Fig. 2: The mean cluster dung per forest type.

where the shrub cover was more. A study on the American bison reported the similar trends where the animal tends to prefer the forest openings (Hebcock 1967).

Such kinds of studies can help in the conservation effort of the species. For management of bison within a protected area, the manager should keep glades or the forest openings. In those areas, grass cover should be kept high and succession should be arrested. However, there should be long duration study covering all seasons to know habitat preference, or movement of bison in a mosaic forest.

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between dung count and canopy cover. This shows that the Indian bison prefers an area with high grass cover, low shrub cover and low canopy cover. Similar trend was observed in case of dry deciduous and shola forest types. So it can be inferred that the gaur (*Bos gaurus*) does not show any habitat preference between the three forest types but preference was observed within the forest types where canopy cover is low, grass cover is high and shrub cover is low. The preference towards the high grass cover may be influenced by their food habit whereas some of the dominating thorny shrubs like *Lantana camera* may be the cause of their dislike for the places