



Ecology and Population Status of Hog Deer from Narowal, Pakistan

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Abstract

Present study was conducted to determine the habitat as well as the population estimation of Hog deer from the border belt game reserve of the Narowal district, Punjab, Pakistan. The direct observation calculates 163 Hog deer and the indirect method calculates 165 Hog deer from the total area of the border belt game reserve. The vegetation frequency of the area shows that the herbs were dominated over the other plant species, however the maximum cover provided to Hog deer was by three species of plants: *Acacia nilotica*, *Dalbergia sisso* and *Prosopis chilensis*. The relative density, relative frequency and relative cover were calculated to determine the importance value of the vegetation.

Keywords: Ruminants, Cervidae, deer, game reserve, ecology.

Introduction

Hog deer vernacularly called 'Para' is ranked among one of threatened species of Pakistan. It has been extinct from the number of places and its population has been gradually decreasing from where it was present¹. Hog deer includes in an endangered mammalian species of Changa Manga plantation in Pakistan². Nevertheless, Hog deer is not officially listed as an endangered species by ICUN³ but the present situation in most of its ranges, based on our survey and analysis is alarming.

Ecological distribution of Hog deer is extended from Pakistan in the west to the southern Thailand and the Vietnam in the east through the northern India, Nepal, Bhutan, Bangladesh and Myanmar^{4,5}. In Pakistan it is distributed along the riverine marshy places^{6,7} where the rainfall distribution and temperature permit almost a year around vegetation growth as well as agriculture crops insuring a consistent food supply. Although, agricultural crops provide food and shelter to Hog deer but large numbers of population were suffered by local people either hunted or killed by the dogs during harvesting season.

The objective of the article is to determine the ecology, distribution and abundance of Hog deer from the border belt game reserve of the Ravi river, district Narowal, Pakistan.

Geography: The border belt game reserve of the Narowal district (figure 1) in Punjab, Pakistan is along the Indo-Pak border and it consists of 5 miles deep strip having length of 130 km (Lat. 31° 34' to 32° 30' N, Long. 74° 35' to 75° 21' E). The area is typically riverside marshy and have very complex vegetation supporting a lot of the wild animals. Hog deer is one of them. The total area of the district is approximately 2337 km² comprising two tehsils, Narowal and Shakargarh. Narowal tehsil

occupies area of 1065 km² and Shakargarh covers 1272 km² (figure 1). Shakargarh with an altitude of 266 m is bounded to the Ravi river at 24 km on the east. Besides the Ravi river, another stream namely Dake which rises from Jammu Hills traverses this district. The district has an extreme climate. The summer season starts from the April and continue till October, the hottest months are May, June and July. The mean maximum and minimum temperature is 40°C and 24°C respectively.

Material and Methods

In order to observe/calculate the animals, the following material is used: Jeep, Binocular, Measuring tape, Quadrangle, Camera, White paper and Bag. Since Hog deer scattered throughout the border belt area of the game reserve, the ten points are selected for data collection. The points are approximately equidistant and are random. The observation points are included in the Narowal tehsil namely Bathanwala, Badhui Cheema, Daud Khas and Jassar, and the tehsil Shakargarh namely Maddokay, Basahokot, Sujwal, Ikhlaspur, Masrur and Sukhuchak (figure 1).

Vegetation survey: For this purpose 25 quadrates each of 5 x 5 m were studied and a different aspect on the basis of growth, habits, vegetation, was divided into four categories namely Trees, Shrubs, Herbs, and Grasses. Each group was treated separately for comparing the following parameters⁸:

$$\text{Density} = \frac{\text{Number of individual of a species}}{\text{Area sampled (total number of quadrates)}}$$

$$\text{Average cover (as \% of ground surface)} = \frac{\text{Area covered by a species} \times 100}{\text{Total area of the quadrangle}}$$

$$\text{Frequency} = \frac{\text{Number of the quadrates in which species occurred}}{\text{Total number of quadrate}}$$

$$\text{Relative density (RD)} = \frac{\text{Density of species} \times 100}{\text{Total density of the species}}$$

$$\text{Relative cover (RC)} = \frac{\text{Cover of the species} \times 100}{\text{Total cover of all the species}}$$

$$\text{Relative frequency (RF)} = \frac{\text{Frequency value of a species} \times 100}{\text{Total value of all the species}}$$

Population estimation: Hog deer is a small, shy, calm, secretive and thick scrub dweller that rarely comes out from its hiding place for very short period of time, during dawn and dusk, to feed or to drink something. And even this exposure to the semi open place is causal and not compulsory. As animal is night grazer so direct observation can be made in accordance to the time but during day time observation can be made by beating the bushes of the specified area from outside to inside in a line and process is repeated at different sampling points. Due to the disturbance animal comes out of the dense vegetation and can be easily observed.

At night animal can be observed by search light and head light of the vehicle was prove a strong tool for this purpose. As the light will be some sort of the disturbance for the animal, so they try to move away from the site of the disturbance and we can observe them easily and even counting can also be done. Foot prints of the animals were considered in different parts of the game reserve. The foot prints in the grazing areas and near the drinking water were in lot of number. The foot prints observation was excellent at the bank of the river where these hooves were present in the mud. The fecal pallets were an indication of the presence of Hog deer and consequently we considered the droppings. The droppings were found near the grazing area on the river side.

Population density was calculated by using the following formula:

$$\text{Est. Pop. (P)} = \frac{\sum \text{EMnP} + \sum \text{EMaP}}{2}$$

Whereas, EMnP and EMaP are expected minimum and expected maximum population.

Results and Discussion

Vegetation: The studied area consists of the Ravi river belt which includes natural vegetation as well agricultural land. Most of the game reserve has been cleaned for agriculture purpose but some patches of the natural vegetation provide the natural habitat to Hog deer. The rain distribution and other climatic factors favour almost a year around growth of grasses, shrubs and some hard wood trees. Most of the plantation has

been removed as a result of overexploitation except for a few found scattered at certain places that are under the control of Army/Rangers for the defense purpose.

Most important trees in the area includes *Acacia nilotica*, *Dalbergia sisso*, *Prosopis chilensis*, *Ziziphus mauritiana*, *Prunus mahalaleb*, *Ficus religiosa*, *Eucalyptus camadulensis*, *Capparis decidua*, *Ficus elastic*, *Azadirachta indica*, *Morus alba*, *Magnifera indica*, *Phoenix sylvestris*, *Tamarix aphylla* and *Tamarix dioica*. The area supports a mixture of shrubs like *Saccharum spontaneum*, *Sacharum munja*, *Calotropis procera* and herbs *Tribulus oratus*, *Dactyloctenium aegyptium*, *Peganum harmala*, *Chenopodium album*, *Solanum nigrum*, *Cichorium endivia* and *Datura stramonium*. Ground cover mainly consists of grasses *Cyanodon dactylon*, *Digitaria sp.*, *Echinochloa crusgalli* and *Hordeum vulgare*.

Wildlife: The habitat of the area supports many mammalian species including *Macaca mulatta*, *Herpestes edwardsi*, *Sus scrofa*, *Axis porcinus*, *Lepus nigricolis*, *Hystrix indica*, *Boselaphus tragocamelus*, *Hemiechinus collaris*, *Canis aureus*, *Felis chaus*, *Funambulus pennantii*, *Rattus rattus*, *Mus musculus*, *M. booduga* and *Nesokia indica* and bird species including *Falco jugger*, *F. peregrinus*, *Pavo cristatus*, *Francolinus francolinus*, *F. pondirerianus*, *Coturnix coturnix*, *Columba livia*, *Streptopelia decaocto* and *Psittacula krameri* (Table 1). Major crops cultivated in agricultural lands are *Pennisetum typhoides*, *Sorghum vulgare*, *Oryza sativa*, *Triticum indicum* and *Phaseolus radiates* (table 1) which provides food and shelter for the birds and mammals, but not provides the natural habitat for the wildlife.

Population estimation: Direct observation: The locality wise survey of the Hog deer population in the border belt game reserve of the Narowal district was conducted from November, 2008 to April, 2009 (figure 2). Total ten localities were selected for the observation in each month, namely Bathanwala, Budhi-Cheema, Daud Khas, Jassar, Maddoke, Basahokot, Sujwal, Ikhlaspur, Masrur and Sukhu Chack. The locality wise observation of Hog deer shows the six month survey (table 2). The total minimum population observed was 31 and average population of six months in the selected points was 62.5. The population density/km² of Hog deer was found 1.25. The total 163 Hog deer in 130/km² area of the border belt game reserve were estimated (table 2).

Foot prints/fecal pellets observation: Month wise estimation of population through foot prints/fecal pellets were given in table 3. Table 3 shows that the minimum estimated population was 41 and the maximum estimated population was 86 whereas the average estimated population of all the 10 localities was 63.5 (figure 3). On the basis of the foot prints/fecal sample estimation density/km² of Hog deer were worked out and found 1.27. The total 165 Hog deer in 130km² area of the border ballet game reserve were estimated.

Correlation coefficient: Correlation coefficient was used to test the relationship between the observed population and the estimated population.

$$\text{Correlation coefficient}(r) = \frac{\sum XY - (\sum X)(\sum Y)/n}{\sqrt{\sum X^2 - (\sum X)^2/n} \cdot \sqrt{\sum Y^2 - (\sum Y)^2/n}}$$

By using the formula the value for Correlation coefficient(r) is 0.95. Probability value lies below 0.001; therefore, it is highly significant.

Threats and recommendations: The threats based on the results of the present study have been summarized below: i. Agriculture area has been extended up to the Zero line between Indo-Pak due to which the wildlife habitat has been decreased

many fold and there is a serious threat to the wild life. ii. The river Ravi flows in this border belt area and the floods in this river damage the habitat by land erosion. iii. The wildlife and other captive animals cause shortage of food for the survival of Hog deer. iv. The cattle grazers usually fire the wilderness areas to get new growth of the wild species as fodder for their livestock. This act damages the Hog deer population and habitat. v. Indiscriminate hunting without estimation of substandard yield is a major threat to the wildlife in the border belt area. Issuance of shooting and hunting permits is a cause of the wildlife decline. Hog deer visits nearby the insecticide/pesticide sprayed agriculture fields for feeding that cause sometime a great loss to the population.

Table-1
Vegetation analysis of the Hog deer habitat in the border belt game reserve of Narowal

S. No.	Plant Species	Density/ Quadrat	Frequency	Cover	R. Density	R. Frequency	R. Cover	Importance Value
Trees								
1	<i>Acacia nilotica</i>	1.92	76.00	24.16	1.93	5.84	14.41	22.18
2	<i>Dalbergia sisso</i>	1.72	68.00	21.28	1.73	5.22	12.69	19.65
3	<i>Prosopis chilensis</i>	2.56	100.00	31.52	2.57	7.68	18.80	29.06
4	<i>Ziziphus mauritiana</i>	1.08	52.00	9.44	1.08	3.99	5.63	10.71
5	<i>Prunus mahalaleb</i>	0.04	4.00	0.64	0.04	0.30	0.38	0.72
6	<i>Ficus religiosa</i>	0.12	12.00	2.72	0.12	0.92	1.62	2.66
7	<i>Eucalyptus camadulensis</i>	0.60	28.00	3.13	0.60	2.15	1.86	4.62
8	<i>Ficus elastic</i>	0.04	4.00	0.80	0.04	0.30	0.47	0.82
9	<i>Azadirachta indica</i>	0.08	8.00	1.28	0.08	0.61	0.76	1.45
10	<i>Morus alba</i>	0.32	28.00	2.56	0.32	2.15	1.52	4.00
11	<i>Magnifera indica</i>	0.04	4.00	0.48	0.04	0.30	0.28	0.63
12	<i>Phoenix sylvestris</i>	0	0	0	0	0	0	0
13	<i>Tamarix aphylla</i>	0.32	0.32	1.56	0.32	0.02	0.93	1.27
14	<i>Tamarix dioica</i>	0.16	0.12	0.36	0.16	0.01	0.21	0.38
15	<i>Capparis decidua</i>	0.08	0.08	3.13	0.08	0.01	1.87	1.95
Shrubs								
16	<i>Saccharum spontaneum</i>	2.36	100.00	11.68	2.37	7.68	6.96	17.02
17	<i>Sacharum munja</i>	1.88	84.00	11.36	1.89	6.45	6.77	15.12
18	<i>Calotropis procera</i>	0.16	0.16	0.48	0.16	0.01	0.28	0.45
Herbs								
19	<i>Tribulus oratus</i>	10.92	96.00	1.70	10.98	7.37	1.01	19.37
20	<i>Peganum harmala</i>	10.96	80.00	2.70	11.02	6.14	1.61	18.78
21	<i>Chenopodium album</i>	9.24	76.00	1.78	9.29	5.84	1.06	16.20
22	<i>Solanum nigrum</i>	7.88	52.00	3.79	7.92	3.99	2.26	14.18
23	<i>Cichorium endivia</i>	2.04	0.36	0.65	2.05	0.02	0.38	2.46
24	<i>Datura stramonium</i>	0.52	0.20	0.34	0.52	0.01	0.20	0.74
Grasses								
25	<i>Cyanodon dactylon</i>	15.56	100.00	9.33	15.65	7.68	5.57	28.90
26	<i>Digitaria Sp.</i>	13.00	100.00	7.96	13.07	7.68	4.74	25.51
27	<i>Echinochloa crusgalli</i>	8.28	84.00	6.54	8.32	6.45	3.90	18.69
28	<i>Hordeum vulgare</i>	1.80	52.00	2.91	1.81	3.99	1.73	7.54
29	<i>Dactyloctenium aegyptium</i>	5.72	92.00	3.28	5.75	7.07	1.95	14.78

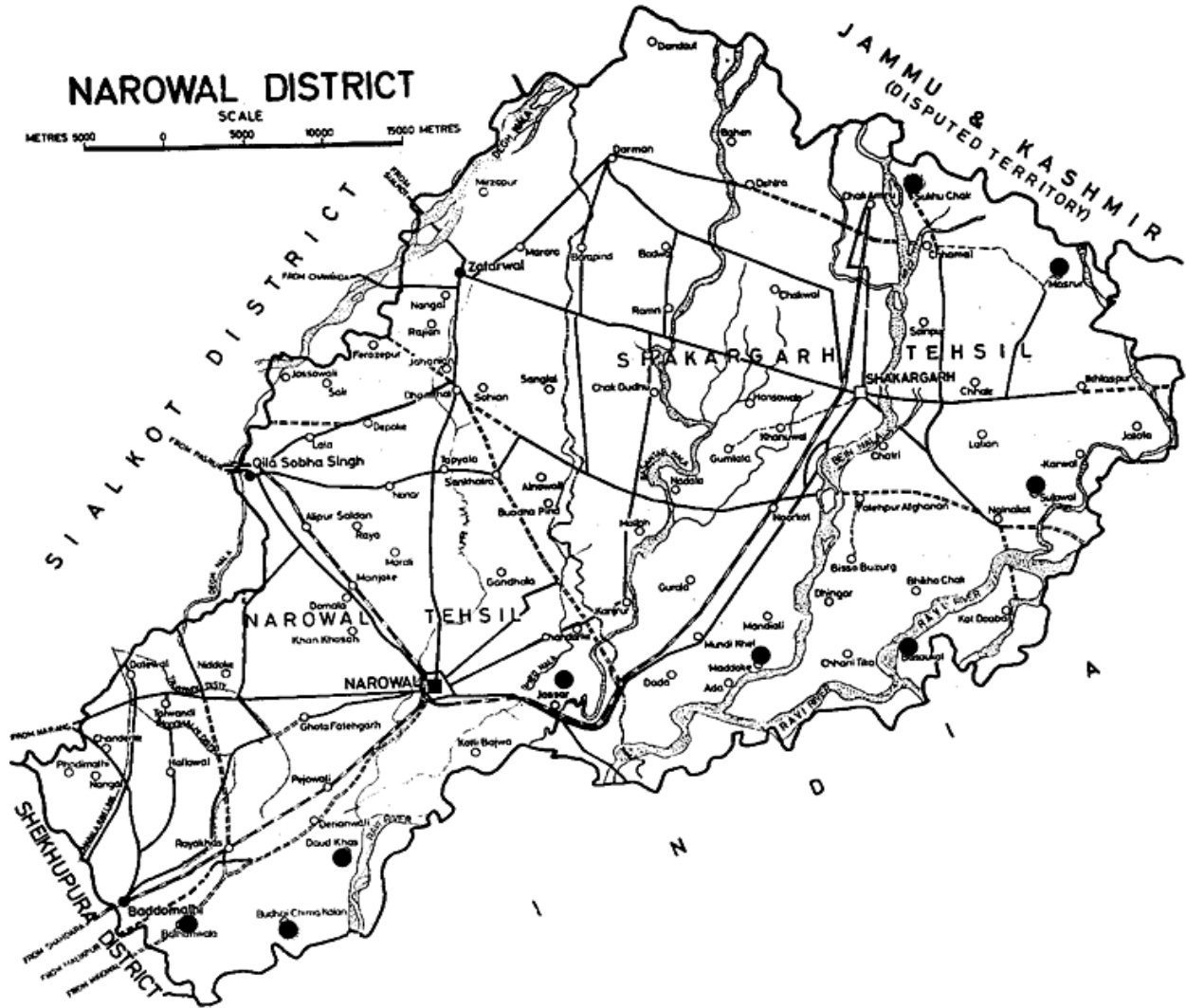


Figure-1

Map of the Narowal district, Punjab, Pakistan; dotted areas show the distribution of Hog deer along the Narowal border belt area

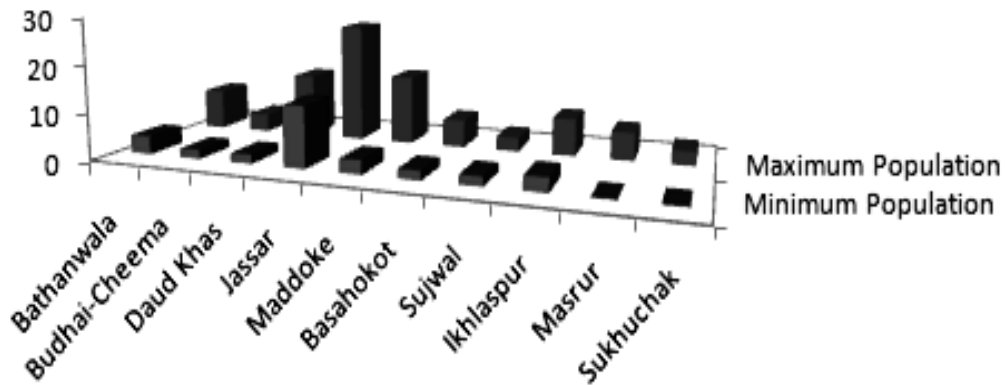


Figure-2

The locality wise observed Hog deer population from the game reserve of Narowal

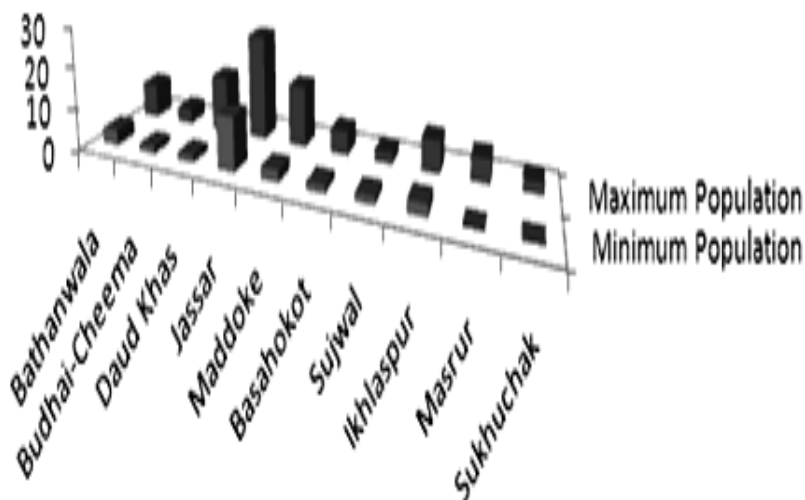


Figure-3
 The locality wise foot prints/fecal pellets estimation of Hog deer from the game reserve of Narowal

Table-2
 The locality wise Hog deer population in the border belt game reserve of Narowal

S. No.	Locality	Deer population observed		
		Minimum	Maximum	Average
1	Bathanwala	4.0	9.0	6.50
2	Budhai-Cheema	2.0	4.0	3.00
3	Daud Khas	2.0	14	8.00
4	Jassar	13	26	19.5
5	Maddoke	3.0	15	9.00
6	Basahokot	2.0	6.0	4.00
7	Sujwal	2.0	3.0	2.50
8	Ikhlaspur	3.0	8.0	5.50
9	Masrur	00	6.0	3.00
10	Sukhu Chak	00	3.0	1.50
Total		31	94	62.5

Table-3
 The estimation of the Hog deer population by foot marks/fecal pellets in the border belt game reserve of Narowal

S. No.	Locality	Min. estimated population	Max. estimated population	Average estimated population
1	Bathanwala	3.0	10	6.50
2	Budhai-Cheema	2.0	6.0	4.00
3	Daud Khas	8.0	12	10.0
4	Jassar	12	17	14.5
5	Maddoke	6.0	9.0	7.50
6	Basahokot	3.0	6.0	4.50
7	Sujwal	00	4.0	2.00
8	Ikhlaspur	4.0	8.0	6.00
9	Masrur	2.0	8.0	5.00
10	Sukhuchak	1.0	6.0	3.50
Total		41	86	63.5

Conclusion

The community participation in wildlife conservation and management will be helpful for propagation of the wildlife species. The public must be informed about the problems and their solutions through electronic media and newspapers. In the border belt area the wildlife staff cannot check poachers. It is suggested that the identity cards may be issued for entering in the border belt areas. The habitat loss by converting it into farmland by agriculture machinery should be stopped to save the wildlife ecosystem. Forestation programmes are carried out to increase the number of trees in the border belt. They will not only provide the natural habitat for the wildlife but also clean the environment. The crops should be cultivated in such a manner that the ecosystem is not disturbed.

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