IMPACT OF HABITAT STRUCTURE ON BLACKBUCK CONSERVATION IN ORISSA

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INTRODUCTION

The Blackbuck, *Antilope cervicapra*, Linn. is an animal of open plains (Gee,1964; Mungall, 1978 and Krishnan, 1972). However, due to loss of their natural habitat by man for agriculture and construction of roads and buildings, they are constantly facing the stress of new environment and the population is restricted to certain places only. They are mostly available in semiarid zones, open scrubs, long grass islands in river valleys and also along the coastal plains. Some information are available on their habitat variability through the works of Prasad and Ramanarao (1982), Bharucha and Asher (1993), Bohra *et al.*, (1992) and Chauhan and Singh (1990). Besides grasses and herbs it also feeds on creepers, climbers and other foliage. Due to a great versatility to adapt to such differences in altitude and vegetational structures, an attempt is made towards conservation for it's survival in future. The present paper deals with the blackbucks inhabiting the cultivated fields of Ballipadar-Bhetani area where the religious sentiment of the local people has protected blackbucks.

STUDY AREA AND METHODS

The Ballipadar-Bhetnai area in the district of Ganjam, Orissa is situated between 19°35' -19°55' N : 84°35' -84°50' E, covering an area of 72.80 sq. kms. It consists of 60 -65% of cultivated lands, 12 -15% rocky elevation, 10 -15% man-made roads and houses, 5 -6% forest cover and about 7 -8% water tanks. The soil is mainly alluvial type and slightly acidic, 80-85% of which constitutes cultivated lands. The minimum and maximum temperature range is from 17°C -41°C and relative humidity between 65 -94%.

The observations were made with the help of 8 x 30 binoculars. The sightings of blackbucks in different habitat types were recorded during different seasons and the relative preference of crops was established from the data. The population structure and human-animal interaction were critically examined.

RESULTS AND DISCUSSION

The habitat types inhabited by blackbucks are classified into the following :

a) Cultivated lands constituted of 60 -65% of total area and with a variety of crop plants like *Oryza sativa, Eleusine coracana, Phaseolus mungo, Cajanus indicus, Arachis hypogea, Sesamum indicum* and *Lathyrus sativus.*

b) Grassland vegetation formed 4 -5% of total area. The dominant plant species were: *Celosia argentia, Cyperus rotundus, Panicum frumentaceus, Cammellina benghalensis, Tridax procumbers* and *Phoenix sylvestris.*

c) Forest covers about 5 -6% of total area where trees like *Acacia nilotica, Eucalyptus* sp. and *Anacardium occidentale* are abundant.

d) Rocky elevations share 12-15% of total area. *Mimosa himalayana, Mimosa pudica, Flacourtia* sp. are amomg the major thorns along with a few variety of shrubs and trees.

e) Water tanks occupy 7 -8% of the area. The plants like *Hydrilla verticellata, Elchornia crassipes* and *Ipomoea aquatica* are the major aquatic plant varieties.

f) Man made houses, roads and other settlements constitute 10 -15% of the total area.

The detail about blackbuck population was studied for the year 1994-95. The maximum herd size was 37 while the minimum was 1. The mean herd size was 6 and herds of 2 individuals were more frequent. The maximum number of social groups was within the range of 3-9.

A major portion of the habitat occupied by blackbuck is formed of cultivated fields. Hence the availability pattern of crops at different phenological stages is important to analyse the changing response of blackbuck. The details are recorded for the year 1994-95 (Table-1 & 2). During the winter the cereals and other kharif crops are at their harvesting stage and pulses are at the stage of sowing or growing. The rabi crops attend their maturity towards mid-summer. Late summer was without crops and the soil of cultivated lands are well ploughed. The crop seeds of *E. coracana* (ragi), *O. sativa* (rice), *P. mungo* (moong), *S. indicum* (til) and *L. sativus* (khesari) are sown. At the onset of monsoon, they start growing which continues till 2nd week of July. *A. hypogea* (groundnut) ragi and pulses are raised on slopey plains whereas *C. indicus* (Pegion pea) is grown on the boundaries of paddy fields. Paddy is the main crop in this area and at the time of scarcity it gets water supply from large water tanks. The heavy to medium rainfall from June to August is the main water supplier to the paddy crop. The second paddy crop cultivation is not experienced here due to non-availability of adequate water supply during summer months. During this period vegetables like Brinjal, Cauliflower, Cucurbits and Onion are at growing stages and water is supplied from wells.

The blackbucks of this area are found to get highly palatable plants among available varieties. The sprouts of rice and ragi during premonsoon, moong and pegionpea in winter are the highly prefered crop plants. Grasses like *C. rotundus* and *C. dactylon* are favourable throughout the year. The concentration of blackbucks to most preferred cropfields signifies the degree of preference. However, in late summer they utilise leaves of *Mangifera indica, P. sylvestris* as well as *T. procumbens.* During monsoon the feeding and resting ground differs significantly. Though the blackbucks choose a place of rest within the cultivated field with preferred food plants during monsoon, the water logged muddy fields make them to choose some other places of rest. The crop field boundaries or grass lands are selected for resting during this time although the cereals are more favoured than the grass varieties.

Blackbucks of this area live in close proximity to human settle-

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ments. There is religious sentiment of the old people that the land being used by blackbuck gains in fertility more vigorously giving a better yield than those not grazed. They feed on weeds growing between the crop plants or stimulating plant growth by grazing (McNaughton, 1979 a,b). This argument is true for low density as well dispersed blackbucks, but in high density, monetary loss to agricultural crop damage because of the attack of domestic animals on their grazing ground ultimately affecting human blackbuck relationship. Disturbances from cultivators, invasion of cattle and automobile increase stress on the survival of blackbucks. Creation of unusual sounds made by human beings or fire crackers are responsible for their habitat degradation.

In accordance with the seasonal variation, the blackbucks change their movement pattern and if allowed undisturbed for a considerable period, they raid the entire field of preferred food plants. This affects the socio-religious sentiment of the people as suggested by Howard, 1974. Hence a careful assessment of crop damage will be first and foremost for blackbuck conservation. Adequate compensation to poor farmers and supply of subsidised seeds and fertilisers to encourage them would be another way of solving the problem.

Control of grazing activities by cattle, sheep and buffaloes in the areas to minimise their competition with blackbuck should be made through different awareness camps. The strategy for farmers to guard their fields by remaining vigilant during cropping season is also helpful (Chauhan and Singh, 1990). However, the most effective economic solution should be to encourage farmers to grow less susceptible and locally compatible crops like khesari and til in places of highly susceptible crops, like ragi and moong. Jhala (1993) suggested the use of sunflower (*Helianthus* sp.) and castor (*Ricinus* sp.) in place of susceptible sorghum. Some local people should be appointed as enforcement staff who can help in blackbuck conservation.

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REFERENCES

Bharucha, E. and Asher, K. (1993). Behaviour patterns of blackbuck *Antilope cervicapra* under suboptimal habitat conditions. *J. Bombay nat. Hist. Soc.* 90 (3):371-393.

Bohra, H.C., Goyal, S.P., Gosh, P.K., and Prakash, I. (1992). Studies on Ethology and Eco-physiology of the Antelopes of the Indian Desert. *Annals of Arid Zone* 48 (21):83-96.

Chauhan, N.P.S. and Singh, R. (1990). Crop damage by overabundant population of Nilgai and Blackbuck in Haryana (India) and its Management. *Proc. Vertebr. Pest Conf.* (L. R. Davis and R. E. Marsh, Eds) Univ. of Calif., Davis.

Howard, D.E. (1974). The biology of predator control. *Addison Wesley Module in Biology* (Reading, MA: addison wesley)

Jhala, Y.V. (1993). Damage to sorghum crop to black buck: Grassungulate relationship in Serengeti. *Int J. Pest Management* 39 (1):23-27.

Krishnan, M. (1972). An ecological survey of larger mammals of Peninsular India. *J. Bombay nat. Hist. Soc.* 69 (3):469-473.

Mc Naughton, S.J. (1979 a). Grazing as an optimisation process *American Naturalist*, 113:691-703.

Mc Naughton, S.J. (1979 b). Grassland-herbivore dynamics. *In A.R.E. Sinclair and M. Norton Griffiths,* (Eds) Serengeti (Chicago:Univ. of Chicago Press) 46-81 pp.

Mungal, E.C. (1978). *The Indian Blackbuck Antelope*: A Texas view. The Texas A and M University System, College Station, Texas, 183 pp.

Prasad, N.L.N.S. and Ramana Rao J.V., (1984). Evaluation Habitat Structure of Blackbuck *Antilope cervicapra* with special reference to mudmal and its relevence to behaviour. *Geobios.*11 (1):17-21.

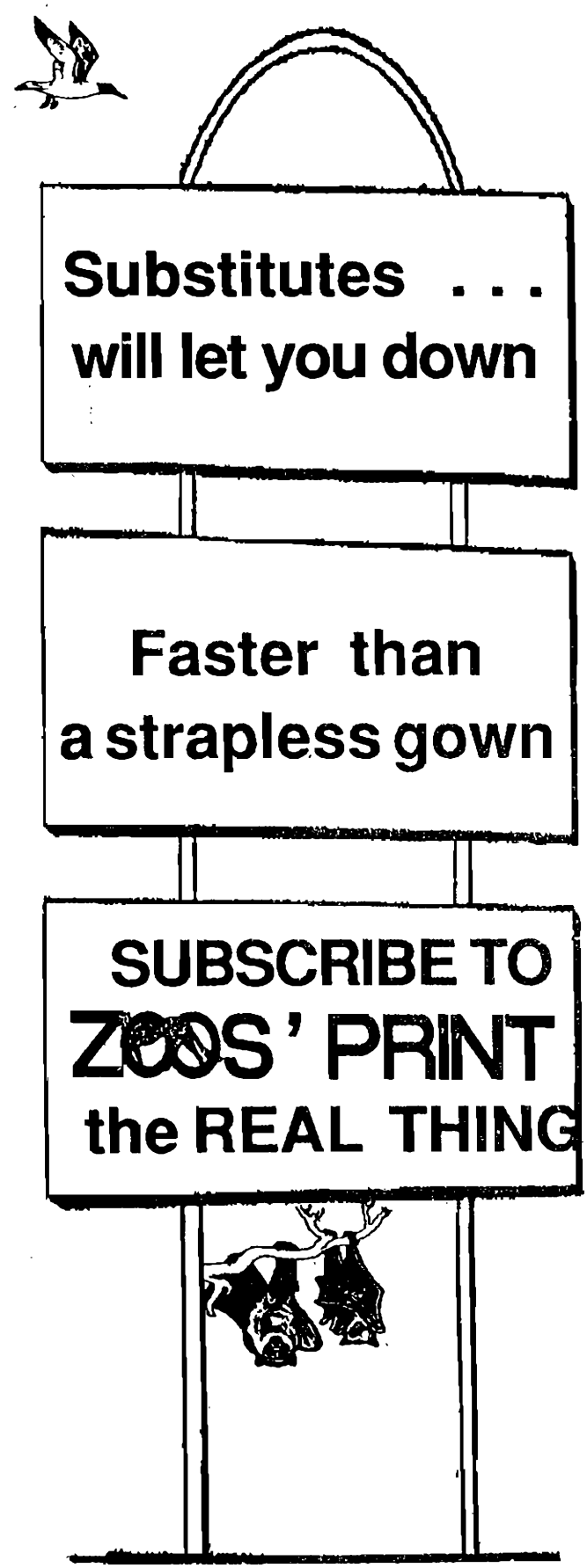
Ramanarao, J.V. and Prasad, N.L.N.S., (1982). *Management and Husbandry of Blackbuck*, FAO Regular Programme No: RAPA 53:76 PP.

Table 1. Seasonal variability in crop pattern

Months	Crops									
	Eleusine coracana	**Oryza sativa**	**Cajanus indicus**	**Lathyrus sativus**	**P. mungo**	**Milletia auriculata**	**Cicer sativum**	**Pisum sativum**	**Arachis sativum**	**Sesamum indicum**
Nov 94	H	H	GF	S	HS	S	S	S	H	G
Dec		H	GH	G	S	G	G	G		GH
Jan 95			GH	G	G	G	GF	GF		HS
Feb			GH	H	H	G	H	H		G
March			H		H					GH
April										H
May										
June	SG	S			S					S
July	SG	SG			SG				S	G
August	G	G	S		G				G	G
Sept	G	G	SG		G				G	GH
Oct	GH	GH	G		GH				GH	HS

Abbreviations used: G: Growing; F: Flowering; S: Sowing or Planted, H: Harvesting

Table 2. Dietary Items of Black buck

Name of Plant Species	Seasons		
	Sum.	Mon.	Win.
Grasses :			
Cynodon dactylon	+	+++	++
Panicum frumentaceum	-	+	-
Andropogon aciculatus	-	+	-
Andropogon squarossus	-	+	-
Eregrostis cynosuroides	-	+	-
Colosia argentia	-	++	+++
Cyperus rotundus	+	+++	+
Commelina benghalensis	-	+	+
Crops			
Oryza sativa (L.F)	-	++	+
Eleusine coracana (L.F.F^{l}.)	-	+++	++
Pulses			
Cajanus indicus (L.F.F^{l}.)	-	++	++
Phaseolus mungo (L.F.F^{l}.)	+	++	+++
Lathyrus sativus (L)	-	-	+
Milletia auriculata (L.F^{l})	-	-	+++
Cicer arietinum (L)	-	-	+
Pisum sativum (L)	-	++	+
Oils			
Arachis hypogiea (L)	-	++	+
Others			
Acacia nilotica (F)	+	-	-
Phoenix sylvestris (L)	+	-	-
Tridax procumbens (LF)	++	-	-
Abutilon indicum (F)	+	-	-

N.B: +++ = High; ++ = Medium; + = Low;
F = Fruits, F^{l} = Flowers, L = Leaves;
- = Indicates regularly eaten