

# Estimating Hog deer *Axis porcinus* population in the riverine forest of Taunsa Barrage Wildlife Sanctuary, Punjab, Pakistan

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## ABSTRACT

The current study aimed at estimating the existing population status of hog deer in the Bela (riverine) forest of Taunsa Barrage Wildlife Sanctuary. The study area was divided into blocks where random line transects were laid to collect population data and to identify potential habitat of hog deer. In Bela forest, the habitat of hog deer comprises of a blend of *Tamarix* species with grass cover and scattered growth of *Acacia*, open grassy areas and water ponds. The results revealed that the estimated population of hog deer in the Taunsa Barrage Wildlife Sanctuary is 115. The core habitat, represented by Block 1 is the suitable habitat with a population of about 30 animals. The field investigation suggested that existing hog deer population is not evenly distributed throughout its historic range in Bela forest due to patchiness of its preferred habitat in the region and hence it is restricted only to Block 1. This study concludes that hog deer population is absent in areas of dense human population and agricultural areas whereas removal and cutting of grasslands inside protected area has resulted in fragmentation of population of this species. Considering the anthropogenic pressures and the natural processes, the long term viability of this small population of hog deer seems uncertain in this area. There is a need to carefully manage the hog deer population and require scientific management and immediate conservation measures.

## Introduction

Hog deer (*Axis porcinus*) belongs to the family *Cervidae*. The habitat of hog deer consists of moist grasslands associated with rivers (Biswas and Mathur, 2000). It is known to have reached to highest densities in floodplain grasslands (Odden *et al.*, 2005). Some reports revealed that hog deer avoids closed-canopy forest while it prefers to live in coastal grasslands (Peacock, 1933). Some conservationists regard hog deer to be an obligate grassland species in the *Terai* Arc-Landscape region of India. Studies in India and Nepal have further shown a preference for grasslands dominated by blady grass (*Imperata cylindrica*) (Biswas, 2004). In Thailand and Indo-china, alluvial floodplain grassland seems to be potential habitats to host hog deer (Maxwell *et al.*, 2007). Based on the available literature, Bardia National Park population of hog deer is much higher in floodplain in comparison to the riverine regions (Odden *et al.*, 2005). The existing population of hog deer in Bangladesh is located in grassy, lightly wooded and hilly areas (Khan, 2004). Extensive tall floodplain grasslands in the Dong-Nai catchments, Vietnam are historically known for hosting high population of hog deer.

Hog deer generally grazes on young grasses, herbs, flowers and fruits and usually browse on young leaves and shoots of shrubs and particularly on *Imperata cylindrica* and *Saccharum spp.* (Dhungel and Ogara, 1991). It is thought to be more a grazer than a browser in Sambar (*Rusa unicolor*) region. Introduced species of hog deer in Sri Lanka, on the other hand, occurs mainly in scrub and cinnamon gardens causing significant damage to home crops (McCarthy and Dissanayake, 1992). In areas of no anthropogenic pressure and undisturbed ecosystems, hog deer apt to be crepuscular with major day-time activity and several at night, particularly in the hot and wet seasons (Dhungel and Ogara, 1991). Depending on the regions and environments, it tends to become more nocturnal and solitary due to hunting pressure. The main social group is of female and fawns; when few hog deer are together, they do not form a unit fleeing when flushed in different orders rather than as one. In Chitwan, hog deer are essentially sedentary (Dhungel and Ogara,

1991), while in cultivated landscapes like Sri Lanka, their activities are traced to be predisposed by agricultural seasons (McCarthy and Dissanayake, 1992). Based on the different seasons and environments they move into grasslands (higher-lying) in reaction to monsoon flooding in India, Myanmar and apparently all over their range (Peacock, 1933). It is evident that the rut is during September to October in Nepal and India and most probably based on captives, during September to February in China. The literature further elaborates that one to two fawns are born during April to May in Nepal and during April to October in China. The gestation period of hog deer ranges from 220 to 230 days (Dhungel and Ogara, 1991). The fawns wean at 6 months while reaching sexual maturity at 8 to 12 months. The highest recorded life span of hog deer is 20 years.

## Population status in Pakistan

Literature divulges that hog deer are populated in riverine grasslands beside the Indus valley and its upper tributaries. It is typically distributed in the Indus river forest reserves of Sind Province while small populations are present around the Indus mouth to the north of Sukkur (Roberts, 1977). It is also present in the Protected Areas of Chashma Barrage Wildlife Sanctuary while it has been significantly reduced in Head Islam/Chak Kotora Game Reserve. Reports further enlighten its potential presence in Lal Suhanra National Park. Taunsa Barrage Wildlife Sanctuary and possibly Rasool Wildlife Sanctuary are regarded as potential habitats for hog deer (Whale, 1996) although no documented proof is available on its recent records. In Pakistan, it is confined to the riverine forests in the plains and particularly in areas of dense grass thickets dominated by *Saccharum spontaneum*, *Saccharum munja* and *Tamarix dioica*.

The hog deer is one of the least studied species in Pakistan. Conservation efforts have therefore, been initiated by the Pakistan Wetlands Programme (WWF - Pakistan). The current study was designed to estimate its population status and distribution range, identify preferred habitat types and to evaluate threats to survival of this species in *Bela* forest of Taunsa Barrage Wildlife

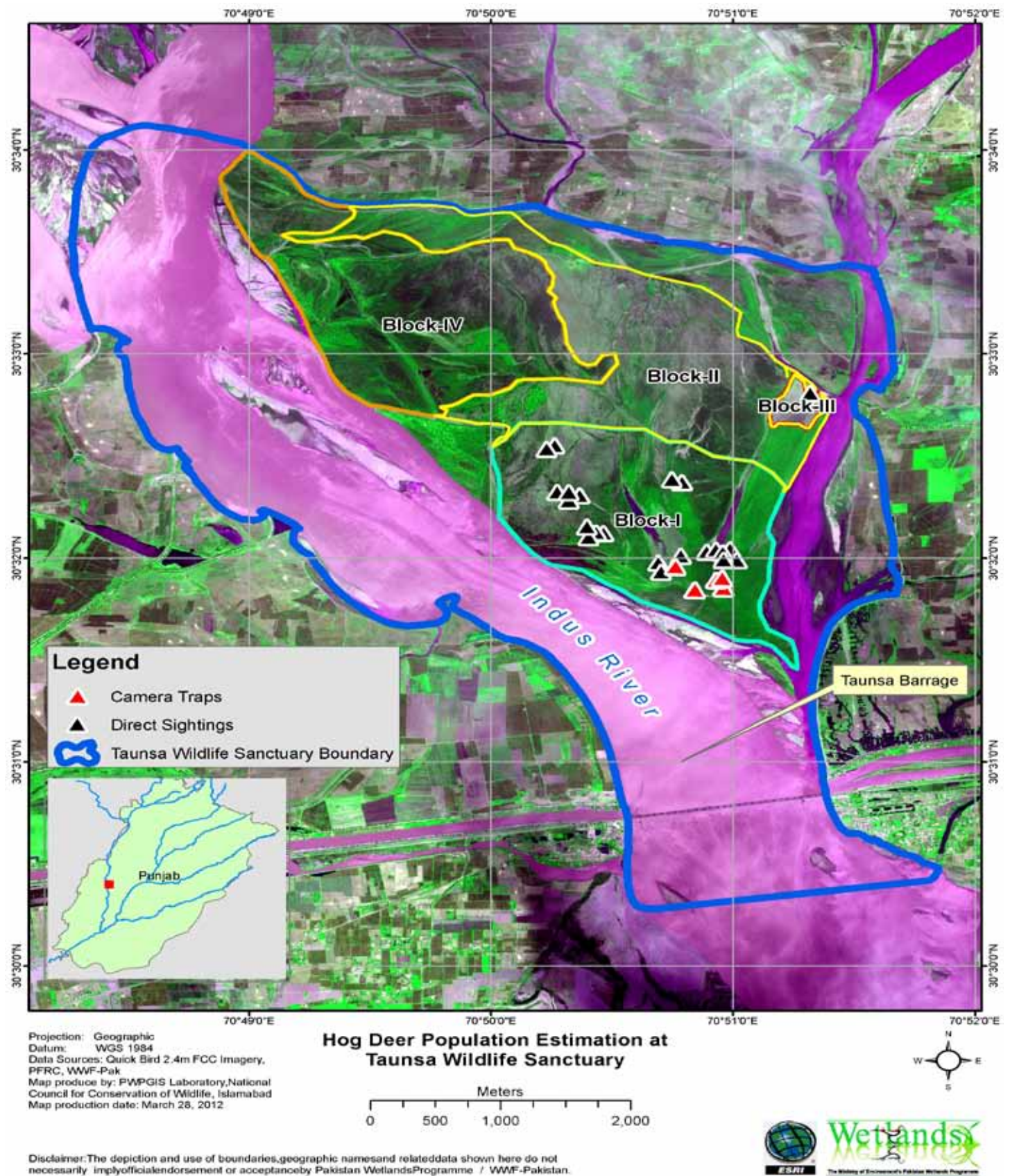


Figure 1: Riverine forest in Taunsa Barrage Wildlife Sanctuary and the Blocks surveyed during the study period

Sanctuary. Furthermore, developing a set of recommendation for sustainable management and conservation of the existing hog deer population in the Sanctuary was also an important objective of the current study. This scientifically validated approach could be further identified to conserve hog deer in Pakistan for its various ecosystem services.

## Material and Methods

### Study Area: Taunsa Barrage Wildlife Sanctuary

The study was focused on the *Bela* forest (N: 30°32'17.4 E: 070°50'43.8) in Taunsa Barrage Wildlife Sanctuary (TBWS), Muzaffargarh district in Punjab province of Pakistan. The area is offering potential habitats to host the population of hog deer. Taunsa Barrage was notified as Wildlife Sanctuary, a legally Protected Area, by the Punjab Wildlife and Parks Department in 1972. The Sanctuary consists of 2,800 ha area, situated about 20 km northwest of Kot Addu Town. TBWS is one of the 19 internationally important Ramsar Sites in Pakistan recognised in 1996 and also designated as an Important Bird Area (IBA) in 2005 (Li & Mundkur, 2007). It is a potential habitat to important wildlife species including hog deer and the second most endangered Indus River dolphin (*Platanista gangetica minor*). The other species of large mammals identified in this area are Wild Boar (*Sus scrofa*), Jungle Cat (*Felis chaus*) and Asiatic Jackal (*Canis aureus*). It is recognised as an important wintering site for a large number of waterbirds. Smooth-coated Otter (*Lutrogale perspicillata*) was also historically reported. The hog deer is predominantly coupled with the riverine habitat of *Tamarix* and *Saccharum*, presented in this Sanctuary that provide good hiding places to hog deer. Decline in water supply to riverine ecosystems has led to the loss of suitable habitat of this species (Robert, 1997).

### Data Collection

#### Selection of Blocks (Compartments)

*Bela* forest was divided into four Blocks which are termed as Block I, II, III and IV (Fig. 1). These blocks were mapped and selected to estimate hog deer population in the study area as described in Table 1.

**Table 1:** Forest blocks (compartments) selected for hog deer survey in Taunsa Barrage Wildlife Sanctuary

Block #	Area (Ha)	Area (Km <sup>2</sup> )	Description	Dominant Vegetation
Block-I	259.2	2.592	Protected area and potential habitat to host hog deer	<i>Tamarix</i> species with grass cover and scattered growth of <i>Acacia</i> ; open grassy areas, <i>Saccharum spontaneum</i> , <i>Saccharum munja</i>
Block-II	424.4	4.244	Protected area with no potential habitat to host hog deer	Dense vegetation of <i>Saccharum spontaneum</i> and <i>Typha</i> growth
Block-III	10.4	0.104	Human encroachment and agricultural lands	Populated area
Block-IV	284.8	2.848	Burnt area	Burnt area, <i>Saccharum</i> and <i>Typha</i>

#### Reconnaissance survey

A questionnaire was developed and meetings were arranged with different community members and local inhabitants regarding the hog deer distribution in the area. Before conducting interviews, it was confirmed whether the interviewee can recognise the species by showing pictures of hog deer. The feedback from local communities was used to compile the information on the presence or absence of the species in particular areas of the Sanctuary.

#### Sign Survey

The indirect method of tracks and other signs; hoof impressions on the soft ground, hair and faecal samples were used for detecting the presence of the species. Binoculars were used to spot the animal and Geographical Positioning System (GPS) Receivers were used to record the coordinates of indirect signs. Measurements of foot prints were taken to identify the species with the help of an experienced hunter from the region. A data recording sheet was

used to record all the field observation and possible photographs were taken.

#### Line transect

For the survey of hog deer, line transects were laid with a standard speed on foot and vehicle (Caughley and Sinclair, 1994). During the survey, vehicle speed of 10-15 km/hour was maintained. Transect sites were selected near feeding grounds in potential habitat areas of hog deer where their presence was confirmed during reconnaissance/track survey. The GPS location of line transects and visual sightings of hog deer during field survey was recorded.

## Results and Discussion

The current study reveals that hog deer is present in the *Bela* forest of TBWS in an area of about 978.8 ha (9.8 km<sup>2</sup>). The estimated population of hog deer comprises of 115 animals in *Bela* forest where the population density is 11.8 animals per km<sup>2</sup>. However, the existing population is confined to Block I representing the core zone where the estimated population is about 30 animals in an area of 2.60 km<sup>2</sup>. The total population of hog deer has been estimated by using the following formula, which is comparable to the studies of population density conducted by Burnham *et al.*, (1980) and Schemnitz (1980).

$$P = \frac{a z}{2 x y}$$

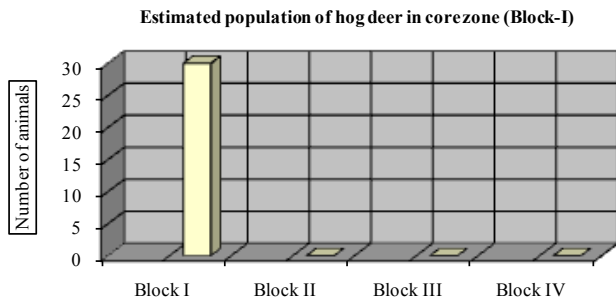
**Where,** *P*= population, *a*= total area of the study, *Z*= no of animals flushed, *X*= length of strip, *y*= average flushing distance.

It is evident that Block I presents a suitable habitat for hog deer while Blocks II, III and IV are not showing any evidence to host hog deer Population (Fig. 2). This habitat comprises of a blend of *Tamarix* with grass cover and scattered growth of *Acacia nilotica* and some open grassy areas and water ponds. The area outside

this core zone is populated area with agricultural activities, burnt area and/or is dominated by *Saccharum* and *Typha* growth and hence these two species do not provide a suitable habitat to the hog deer.

Hog deer home range varies from 5 – 70 ha with a density of 0.1 animal/km<sup>2</sup> in grassy floodplains rising to about 19 individuals/km<sup>2</sup> in riverine valleys (Fafarman and DeYoung, 1986). In Nepal, the density of the hog deer is 0.1 animal/km<sup>2</sup> in a riverine forest, 16.5 animals/km<sup>2</sup> in Savanna and 35 animals/km<sup>2</sup> in grassland floodplains (Wemmer and Green, 1998). Keeping in view the population size of hog deer in *Bela* forest, it is assumed that its population is stable in the *Bela* forest with population density of 11.1 animals/km<sup>2</sup>. In the winter season, when the water level in the river drops, water channels become grassy and provide food to hog deer (Fafarman and DeYoung, 1986).

The riverine forest is gradually degrading due to unsustainable use of natural resources. The habitat of hog deer is also disturbed



**Figure 2:** Estimated population of hog deer in core zone (Block I) of *Bela* forest.

due to encroachment by the local community and some cultivation of agriculture in the area. The domestic livestock may compete with hog deer for food. There are no natural predators of adult hog deer in TBWS, although fawns may be taken by Jackals and Jungle Cats (Roberts, 1997). Hunting of hog deer population is not allowed in the Sanctuary, it is however, frequent in the flood seasons when the animals disperse out of the Protected Area. In nature, it is essential to maintain a viable population of a species, having enough adaptability to cope the evolutionary forces for its survival (Soule, 1996). The small populations are subject to genetic problems, demographic fluctuations and environmental variation such as competition, disease and food supply and natural catastrophes like floods (Primack, 1993). The environmental fluctuations are high in *Bela*; high flooding would cause mortalities and would also limit the food supply thus increasing inter and intra-specific competitions. Conversion of riverine habitats into cultivated lands in periphery of the Sanctuary is negatively impacting migration routes of hog deer population.

## Conclusion

This study described distribution and population estimate of hog deer in *Bela* forest of the TBWS. The hog deer is distributed and populated in core area, which provides a suitable habitat to the species; however, this patch appears to be insufficient to support growth in population. Restoring the *Bela* forest in way, which support *Tamarix* as a dominant species in the canopy is urgently needed in order to expand the habitat and to support natural increase in hog deer population. A consideration can be given to supplement the wild population in *Bela* using the captive stock; however, this has to be in line with the IUCN guidelines for the species reintroduction developed by reintroduction Specialist Group. Hog deer population is absent in areas of dense human population and agricultural areas and hence this fact showed that anthropogenic activities influence the presence of hog deer in the study area. This study revealed that there is utmost necessity of future research to ensure better management of existing population of hog deer and to find out possible ways of reducing pressures from its potential habitats.

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