STUDY ON THE LAND USE OF PROPOSED BLACKBUCK CONSERVATION AREA, KHAIRAPUR, BARDIA DISTRICT AND HABITAT OPTIONS FOR TRANSLOCATION OF BLACKBUCK (*Antelope cervicapra)* AT ROYAL SUKLAPHANTA WILDLIFE RESERVE IN KANCHANPUR DISTRICT, NEPAL, BY USING GIS.

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KEYWORDS: Land Use, Blackbuck, Conservation Area, Habitat, Translocation

ABSTRACT
Land use of Proposed Blackbuck Conservation Area (PBCA) at Khairapur, Bardia district and habitat options for translocation of Blackbuck at Royal Suklaphanta Wildlife Reserve (RSWR) in Kanchanpur district, Nepal was studied by using GIS, field survey, direct observation and informal discussion with concerned authorities. Mapping was done with the help of Arc Info 3.2 and Arc View 3.2a. Field research was conducted from March 2002 to June 2002. Our results revealed that the total area of the PBCA is 5.25 km^2 with a perimeter of 10.25 km of which 2.1 km^2 is forest, 2.15 km^2 is grassland and 1 km^2 is settlement and cultivated area. Different locations were identified as the potential translocation sites in the Royal Suklaphanta Wildlife Reserve (RSWR) of Kanchanpur district. Routali Bechuwa phanta, having a substantially larger area along with other features compared to all investigated sites for translocation, was found most suitable alternative habitat.

1. INTRODUCTION

The Himalayan Kingdom of Nepal is a land of cultural and geographical diversity, which exhibits considerable social, ethnic, and linguistic diversity within a small area of 1,47,181 km^2. Nepal is endowed with vast array of biological resources, which are now in critical condition due to exploitation and degradation. Blackbuck, locally known as Krishnasar was once found in large areas of Pakistan, Nepal, India and Bangladesh, is now an endangered species. In Nepal, Blackbuck are now restricted to isolated small area at Khairapur, Bardia district, in a very limited number and is in the verge of extinction. Increased human pressure and isolation of habitat has lead to decrease Blackbuck population in Nepal (Khanal, 2002).

Scattered populations of Blackbuck occurred in Kanchanpur, Bardia and Banke districts in Western Nepal till the late 1960's (Pradhan, Bhatta and Jnawali, 1999). After the eradication of Malaria, jungles and phantas of Terai were converted to agricultural land due to the immigration of human population from hills and with this uncontrolled poaching of Blackbuck also increased. Blackbucks were considered extinct from Nepal during the establishment of Royal Bardia Wildlife Reserve in 1972 but in September 1975 nine Blackbuck were found in Khairi-Panditpur at Bardia district. Immediately District Forest Office, Bardia, and RBNP deployed one/four security guard for the conservation of blackbuk in this area in 1976

January (DNPWC, 1989). However, Blackbuck population in Bardia was found never exceeded 190 individuals. From the first record of Shrestha (1973, cited in Pradhan, Bhatta and Jnawali, 1999) to the report of Bauer (1988) the population increased steadily from 3 individuals to 190 individuals (Figure 1).

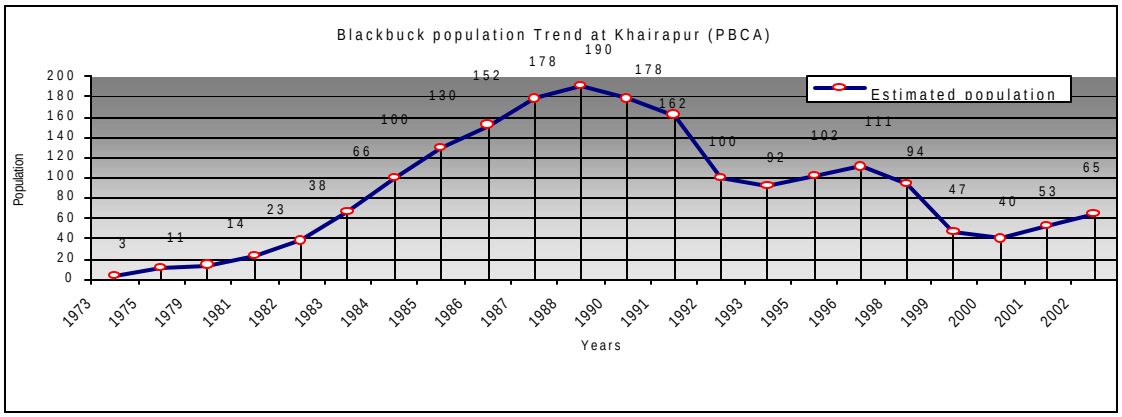

Figure 1: Blackbuck Population Trend at Khairapur, Bardia district (Source: Khanal, 2002).

HMG/N decided to take over 4.8 km^2 of land in 1996, to minimize the encroachment of government land and to maintain the habitat of Blackbuck phase wise according to 'Land Prapti Ain, 1977'. This land belonged to previous Khairapur VDC WN-1, 5, 9 and Gulariya VDC WN-7 and currently located in Gulariya Municipality WN-2. A total of 164.5 ha of numbari land (land having ownership certificate) was acquisited with an expense of eighteen million rupees. Apart from this 94.6 ha of Ailani land (land without ownership certificate) was occupied by 175 households residing inside the PBCA (Pradhan, Bhatta and Jnawali, 1999). These Ailani landowners were not given any compensation and are still living inside the PBCA.

The present paper has two aims - to prepare the land use map of existing Blackbuck habitat at the PBCA Khairapur at Bardia district and to identify and document the potential habitats of Blackbuck inside Royal Suklaphanta Wildlife Reserve at Kanchanpur district.

2. STUDY AREA

This study was conducted in two districts of Nepal, Bardia of western lowland terai and Kanchanpur of far-western terai region of Nepal. Bardia District is situated between 28°7' and 28°39' north and between 81°3' and 81°41' east. Different phantas of Royal Suklaphanta Wildlife Reserve (RSWR) were studied for translocation feasibility of Blackbuck. RSWR situated in Kanchanpur district which lies between 80°25' east and 28°35' north (figure 1).

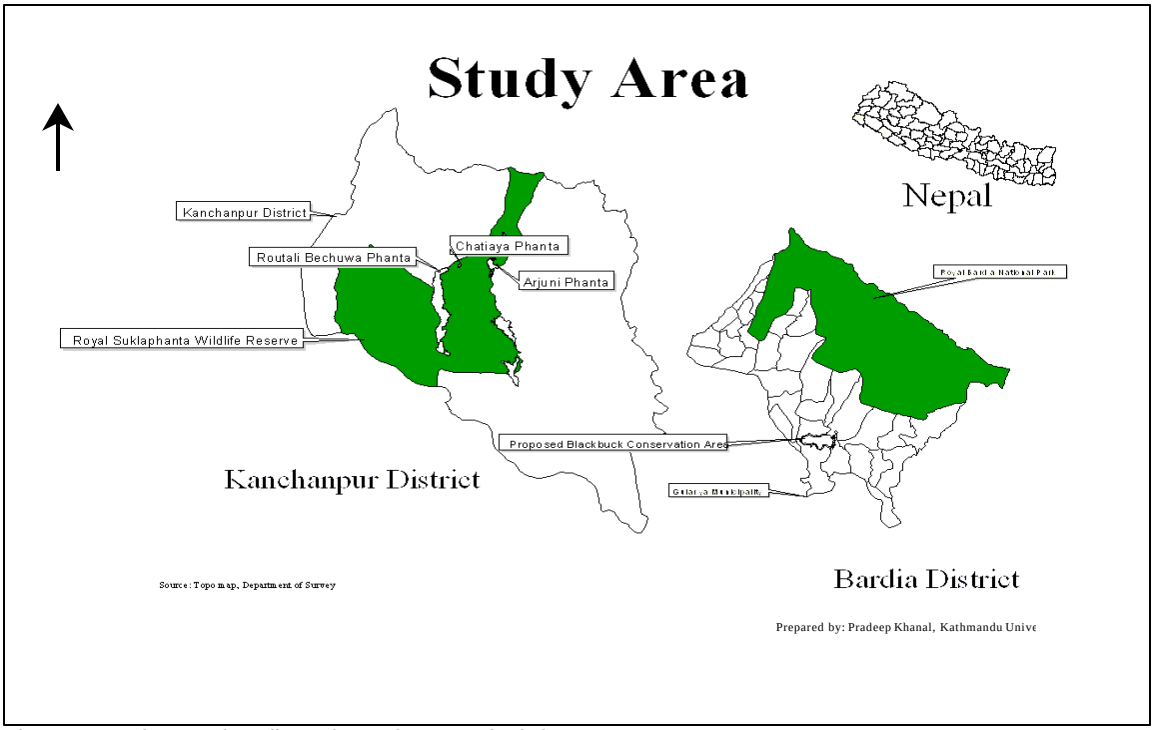

Figure 2: Study Area (Bardia and Kanchanpur District)

3. METHODOLOGY

3.1 Site Selection

Site selection was based on the review of past literature and informal interview with warden of RBNP. Present Blackbuck habitat at Khairapur, Bardia district was selected one of the study site for this study. Kanchanpur district was considered as an alternative habitat of Blackbuck for translocation. Initially, South of Culcutta village, Paparari and Suklaphanta were selected for study, but after discussion with warden and ranger of Royal Suklaphanta Wildlife Reserve (RSWR), local people of Mahendra Nagar and personal observation study sites were changed. The first two sites were highly encroached by the local people and the last one was dominated by tall grass species. Consequently, settlement evacuated extended area of RSWR was chosen as the translocation study area in which five different sites were chosen. However, only three sites Arjuni phanta, Chatiaya phanta and Routali Bechuwa phanta could be investigated during the fieldwork.

3.2 Field Survey

Field survey was conducted on March-June 2002. Bicycle was used to visit different phantas (grassland) at Khairapur and RSWR. Boundary of each phanta and existing water bodies were observed and located in GPS. Vegetation and problems for translocation was identified with ocular observation, informal interviews with local people and concerned authorities.

3.3 Mapping

Survey of PBCA was conducted using Geographic Positioning System (GPS). Each house, waterhole, boundary of phanta and jungle area was survey by GPS and data were transferred to Arc View GIS 3.2a and land use map of the PBCA was developed. Also, Topo-map of scale 1:25000 and Arc Info 3.2 was used for digitize map of Kanchanpur and RSWR along with different phantas.

4. RESULTS

4.1 Land Use of Proposed Blackbuck Conservation Area (PBCA)

4.1.1 Total Area and Perimeter

Total Area delineated for the PBCA is 5.25 square kilometer with a perimeter of 10.25 kilometer. Estimated area of PBCA before this study was 4.88 km^2 only (Pradhan, Bhatta and Jnawali, 1999).

4.1.2 Land Use

Existing land use pattern of the Proposed Blackbuck Conservation area (PBCA) is categorized as follows (Table1):

Table 1: Existing Land use of Proposed Blackbuck Conservation Area (PBCA)

Land Use Type	**Area (km^2)**	**Remarks**
Phanta	2.15	Pataha and Pachas Khala phanta
Forest	2.10	Natural Khair-Simal and Sisoo plantation
Settlement and Cultivated Area	1.00	55 Numbari HH, 108 Ailani HH of which 26 HH were both Ailani-Numbari owners.
Total	**5.25**	Total area of the Proposed Blackbuck Conservation Area

Source: Khanal, 2002.

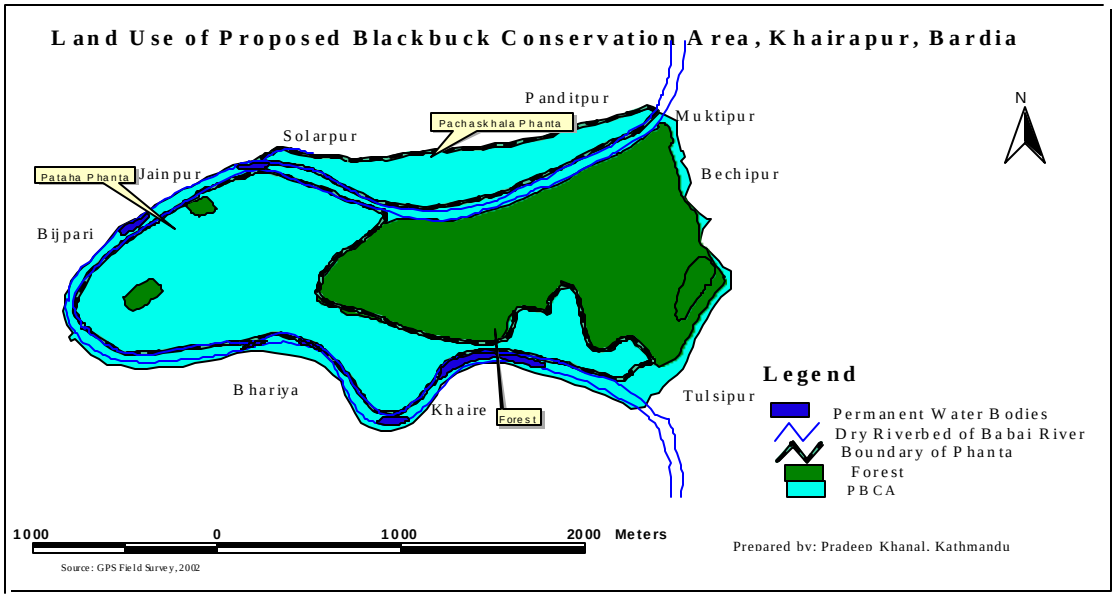

Figure 3: Land use of Proposed Blackbuck Conservation Area, Khairapur, Bardia, Nepal.

4.1.3 Road Network

Total length of motorable road inside PBCA was 9 km and that of foot trail was 8.4 km (Table 2).

Table 2: Road Network inside PBCA

S. N.	Name	Type	Distance (km)
1	Khairan Jhala to Salarpur	Motorable road	2
2	Khairan Jhala to Panditpur (Boundary Road)	Motorable road	4.5
3	Panditpur to Turantapur (Boundary Road)	Motorable road	2.5
4	Khairan Jhala to Turantapur	Foot trail	3
5	Tower to Bhariya	Foot trail	1.4
6	Pachas Khala to Turantapur	Foot trail	2.4
7	Pachas Khala to Turantapur (Jungle route)	Foot trail	1.6
	Total		**17.4**

Source: Khanal, 2002.

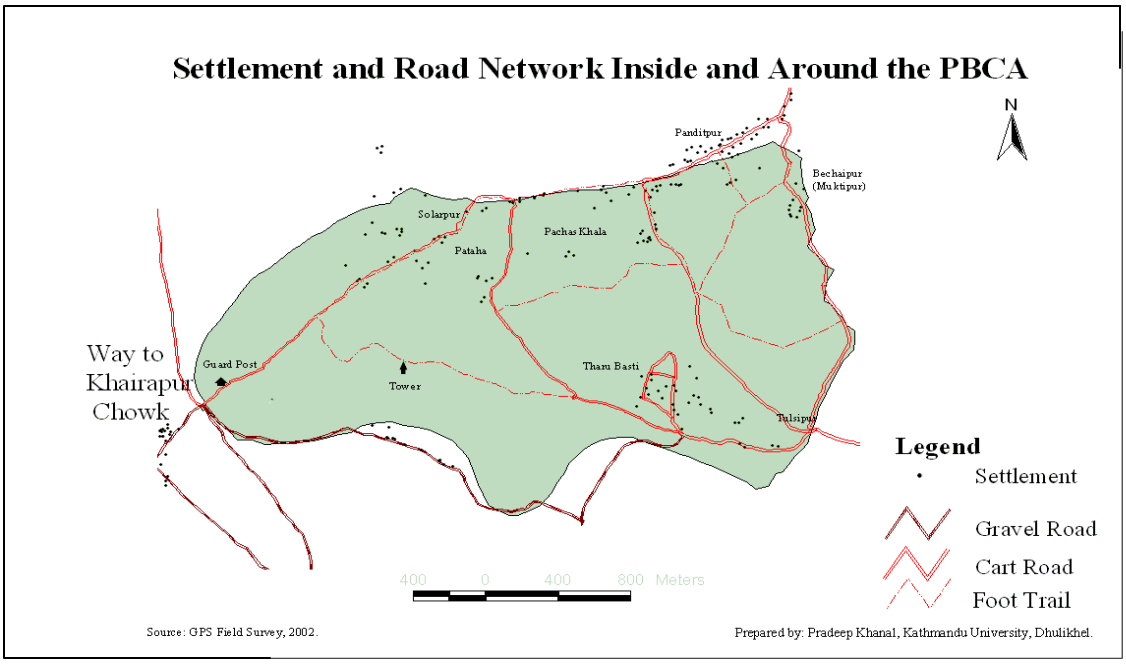

Figure 4: Settlement and Road network inside and around Proposed Blackbuck Conservation Area, bardia, Nepal.

4.1.4 Water Bodies

The core area of the PBCA is situated on the old Babai riverbed which bounded PBCA from west, south and north. Water availability in Sarju Nadi during winter is sufficient for the Blackbuck but in summer only nine small fragmented waterhole remains which were also used by livestock. Besides, two small cemented ponds, one at northern side of the post (134" * 26" * 27") and the other at the southern side of the post (107" * 22" * 27") are also constructed.

4.2 Alternative Habitat for Blackbuck Translocation at Royal Suklaphanta Wildlife Reserve (RSWR) in Kanchanpur District

Table 3: Habitat Characteristics of three different phanta inside RSWR

Characteristics	Routali Bechuwa Phanta	Arjuni Phanta	Chatiaya Phanta
Area	15 km^2	2 km^2	0.25 km^2
Water Bodies	< 0.5 km	< 0.5 km	< 0.5 km
Vegetation	*Cynodon dectylon* dominant species among grass.	*Cynodon dectylon* dominant species among grass.	*Cynodon dectylon* dominant species among grass.
Cultivated Area	> 0.5 km	> 1 km	> 1 km
Road	> 2 km (Village road)	Highway road through the phanta	< 0.5 km (District road)
Park Protection Unit	< 3 km	< 2 km	> 2 km
Invasion of exotics	Yes	Yes	Yes
Water logging	Few places	Yes	Yes

Source: Field Survey, 2002.

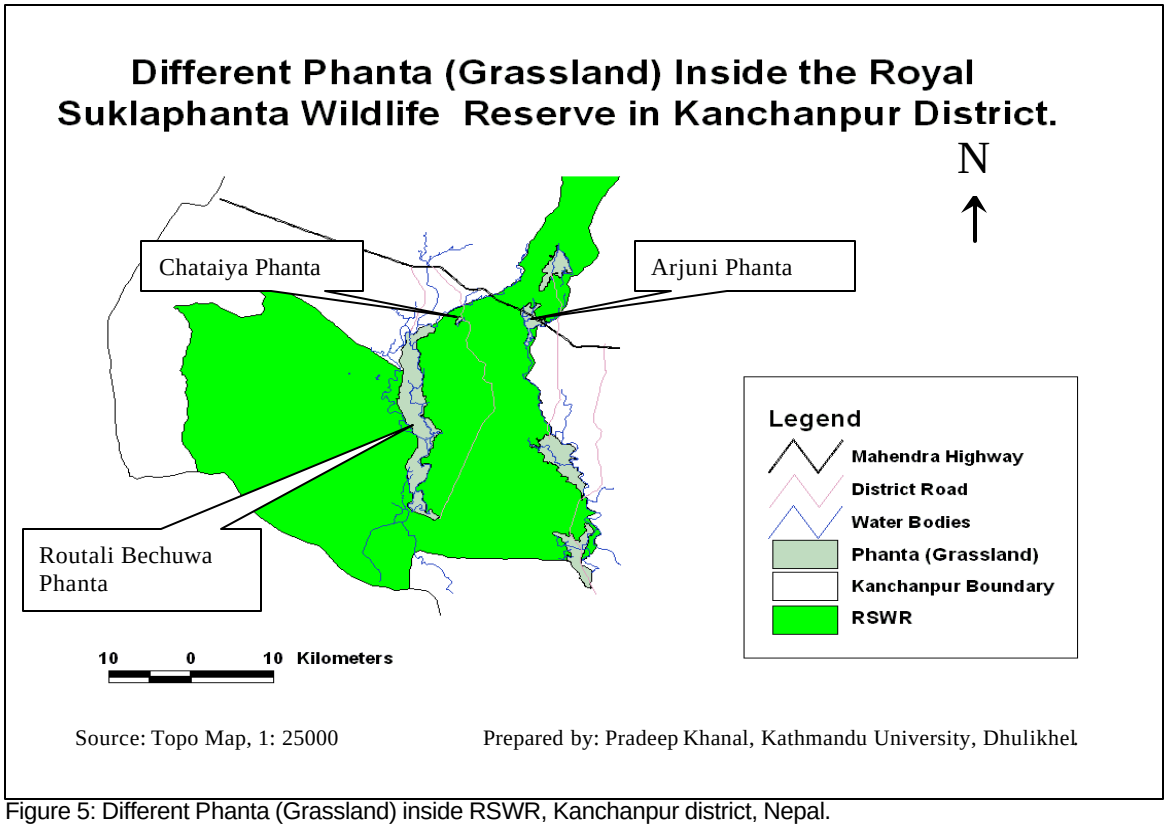

Figure 5: Different Phanta (Grassland) inside RSWR, Kanchanpur district, Nepal.

5. DISCUSSION AND CONCLUSION

Total delineated area of the PBCA was found to be 5.25 km^2 which is 7.04 % higher than previous estimations. Land use includes phanta 41 %, forest 40 % and settlement 19 %. Among phanta, Pataha phanta covers 88 % and was found suitable habitat for Blackbuck where as Pachas Khala phanta covers

12 % and was found encroached by the ailani owners. Road network and settlement inside the PBCA reflects the disturbances caused by human to Blackbuck.

The sizes of the home ranges of Blackbuck vary with the size of the herd, availability of the food, topography of the terrain and intra-specific composition. A herd of 28 animals in Wankaner National Park (India) had a range of approximately 2.5 km^2. A herd of 12 in Kanha National Park (India) had a home range of only about 0.4 km^2 (Ranjitsinh, 1989). At present suitable habitat at PBCA is only 1.8 km^2 (Pataha phanta) where 65 Blackbuck reside. Existing population in Bardia is an isolated population, and this population is considered as a single herd for the purpose of this study. Simulating 64 individual of PBCA with range of 28 animals as in Wankaner National Park shows that they need a range of 5.71 km^2, Where as, comparing with Kanha National Park needed home range of 2.13 km^2. This clearly indicates that habitat used by Blackbuck at Pataha phanta is not enough for the long-term survival. Therefore, appropriate habitat developed inside the delineated area should be given higher priority. Wankaner and Kanha National parks could have better management and thus have relatively better habitat where as Khairapur is heavily grazed by livestock and additionally disturbed by human. Such anthropogenic influences to be reduced for proper conservation.

Regarding the translocation sites, comparing the size, Routali Bechuwa is found most suitable having a substantially larger area compared to other sites. It can accommodate 750 individuals at its maximum capability. One Blackbuck needs 2 ha of land for its territory (Jhala, 1991). However this site has additional encroachment of exotics *Cannabis sativa* besides *Ipomoea fistulata*. So, some active management measures such as burn/slash, up rooting and detailed study of predator ratio, abiotic components like flooding etc. to be undertaken before translocation. Additionally this site has some water-logging problem in the south, which could be overcome by land filling and appropriate drainage mechanism. Because of the presence of natural water sources in the periphery and existing deep bore water facility, availability of suitable and sufficient dominant feeding grasses Routali Bechuwa is considered most suitable for translocation of Blackbuck among the three sites observed. Additionally, this phanta occupy one old cemented house, which can be repaired in minimum cost for Guard post.

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