Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.5, No.3, 2015

Study on the Population Dynamics and Habitat Occupancy of Blackbuck (Antilope Cervicapra) in Ganjam District, Odisha, India

Udaya Kumar Das [1*] Sudhakar Kar [2]
1.Ph.D. Scholar, Department of Zoology,Utkal University, Vanivihar, Bhubaneswr-751004 , India
2. Senior Research Officer, Wildlife Organisation, Forest department, Odisha, Prakruti Bhaban, 5th floor, Nilakanthanagar, Bhubaneswar-751010, India
* Email of the Corresponding auther: (udayak.dash@gmail.com)

Abstract
The habitat use and spreading of blackbuck population was studied during a Government of India funded research project during the Feb-1998 to March 2005 in Balipadar- Bhetnoi blackbuck reserve, Ganjam district, southern Odisha, India. The seasonal variation in vegetation abundance especially in herbs, shrubs and low height scrubs and trees are greatly marked. The topography of the study area is undulated with highlands ranging from 20mts MSL to 100 mts MSL The district receives rainfall of 1551.6mm in interior to 1148.6mm of rainfall in the coastal area. But the area shows severe dryness and most of the habitat behaves semi-arid conditions during the summer season. The overall dryness during summer causes in shrinkage of forage grounds. The animal did movement in greater area in search of forage and water. Some times the animal are confined to the water bodies like small to medium check dams, stream beds and low laying area in the cropland habitat. The migration pattern of these animals depends on the topography, vegetation cover, terrine and rainfall (flooding) and different anthropological pressures. The local people do not harm to the beautiful and harmless animal. They protect blackbuck in a socio-religious aspect and conservation starts a century ago. The past distribution area was so small that to the present distribution. The animal congregate to so large herds during mass forage after post harvest of paddy crops. The blackbuck did assemblage in large numbers touching hundred of individuals in open countryside cropland habitat. The diurnal activity pattern including the group structure also changed according to the vegetation pattern and environmental factors in different seasons.
Keywords: foraging pattern, blackbuck, habitat, vegetation pattern, rainfall, topography, cropping pattern, terrine, environmental factors, migration.

1. Introduction

The blackbuck is a medium sized antelope native to Indian sub- continent. This antelope shows remarkable sexual dimorphism at maturity. Males are on average larger than females, conspicuously colored and having horns. The adult males (sub –species rajputanae) weighs 34 to 45 kg while females weigh 31 to 39 kg (Ranjitsinh 1989). The coats of adult males show striking black or (dark brown) and white under parts, while the coats of females and immature males varies from tan to jet- black. This variation can be seen among the males within a population. Furthermore, even an individual male's coat color may vary seasonally and with his breeding status (Prater, 1971). Unlike Females which are horn less, males bear distinctive long, in rare cases females have also rudimentary horns (Chouhan, 1984), spiral and diverging horns. The conservation status of blackbuck is listed in Red Data Book of IUCN (International Union for Conservation of Nature and Natural resources.) as Vulnerable, under CITES (Convention on International trade for Endangered species of wild flora and fauna) it is categorized in Appendix III. It is classified in Schedule I of Wildlife (Protection) Act 1972.

Photo -1 A herd all male blackbuck of different age groups Talarampalli habitat

The overall drynessduring summer causes in shrinkage of forage grounds making the animals move to distant area in search of water. The animals are confined to the water bodies like small to medium check dams,stream beds and low lying area in the cropland habitat. The raising in the additional population in the older areas tends to migrate in search of farage, habitat and new territory. The topography of the study area is undulated with highlands ranging from 20 meters above sea level (MSL) to 100 meters MSL. The undulation in the terrine supports against flooding in monsoon and availability in similar forages helps the animal to live in newer habitat.

2. Materials and Methods

Blackbuck belongs to the tribe Antilopini and their closest extant relatives are the Gazzells. Two sub-species of blackbuck are currently recognized: the northwestern *A.c . rajputanae* and eastern and southern *A.c . cervicapra* (Groves 1980, Ranjitsinh 1989). Body size, horn length, and darkness of male coats typically decrease from north to south and from west to east (Dharmakumarsinhji and Gaekwad, 1958, Ranjitsinh 1989) Regular observations recorded on all the activities like feeding, standing, territorial movement, breeding, resting, grazing, infighting etc. from dawn to dusk. The sexes and female were identified on basis of their horns, coat color and even the yearling males identified by sprouting small horns without change in body coloration. Activities like resting, drinking, grazing, flehmen before females, pheromone marking by rubbing the muzzles on small trees or standing objects like fencing poles etc are observed. Age-sex classes were made for bucks, does and young. Diurnal observations were made at different times in different seasons for the year 1998-2004.

Observations on animals were made directly in the habitat the study period lasts for 6 years starting from February 1998 to April 2004.Systematic temporal observations were made during early morning, noon and afternoon. The observations were made for 5days in a week in different habitats. Most of the observations were made from Elevated platforms and Machans over tree and watch towers (made by Forest department for tourists) in important places near feeding ground / pastures, waterholes like stream beds / ponds for blackbuck. Direct visual observations were taken with the use of Bushnell binoculars of power 8 X 48. Movement records were done over topo sheet maps and other sketch maps .By the help of Garmin GPS-72, survey was conducted for GIS analysis and ranging pattern of the animal

Photo -2 A magnificent adult male blackbuck in running postion in Betnoi pasture,

Photo-3 Two adult male blackbuck in grazing on Paddy cultivation crop land bunds

A lot of observations were made by transect walk and other survey work on foot inside the intensive study area. And record of time for different activity patterns are done by a sports stop watch and also time from mobile phones.

3.Study area

There are three ranges namely Buguda, Polasara and Aska Ranges of Ghumusar South Forest Division and Khallikoteof Berhampur Forest Division in Ganjam district is situated between 19°33′ - 19°55'N : 84°35'-

85°01'E., covering an area of 300 sq.km. vide Govt. notification No.22755/FFAH dt.19.9.89. Its northern and western boundaries touch the river Badanadi near Kumarsuni Reserve Forest, southern part touches the bank of river Rushikulya and Baghua runs along its eastern boundary. The extremes of the major habitats falls in north most in Betarsingh habitat of Buguda range (Lat N19° 49 25″ / Long E 084° 46′ 50.3″) west most in Gahangu habitat of Buguda range (Lat N 19° 41 32.0″ / Long E 0 84° 40′ 43″), in eastern most habitat of Chikili under Khallikote range (Lat N 19° 33′ 42.5″ / Long E 085° 0′ 48.6″) and the southern most continuous habitat of Babanapur under Asika range (Lat N 19° 40′ 29.7″ / Long E 084° 41 ′ 33.7 ″) The s tate highw ay (SH 33)connecting Berhampur to Nayagarh v ia Buguda and the Khallikote Bhanjanagar state highway passing through Kodala, Kabisuryanagar, Asika an passes through the major habitat portion the district.(Das &kar 2011).

The habitat extends beyond the boundaries as blackbuck population are also seen in some isolated pockets. The state highway (SH 33) connecting Khurda and Berhampur via Nayagarh passes through the study area and the state highway from Khallikote to Asika cover the most of the habitat. The major part of the study area for blackbuck was almost covered by the 19 survey transects, and some other isolated pocketed patches of habitat still occupied by blackbucks are only covered during census operations. Line transect surveys was made to know the habitat use and relative abundance of the sighting of animalss and study on herd structures. Maximum care taen during line transect survey during dry seasons.

The whole area under study consists of Ballipadar - Bhetnoi and there are about 50 neighboring villages with a human population of around 40,000 and the cattle population will be above 15000. The blackbucks live in peacefully in the habitats of three forest ranges and they are protected in a socio- religious sentiment of the local people. The study area consisted of 60-65 % cultivated land, 12-15% rocky elevations, 10-15% manmade houses and roads, 5-6% forest cover and 7-8 % tanks / water body (Kar, 2000).

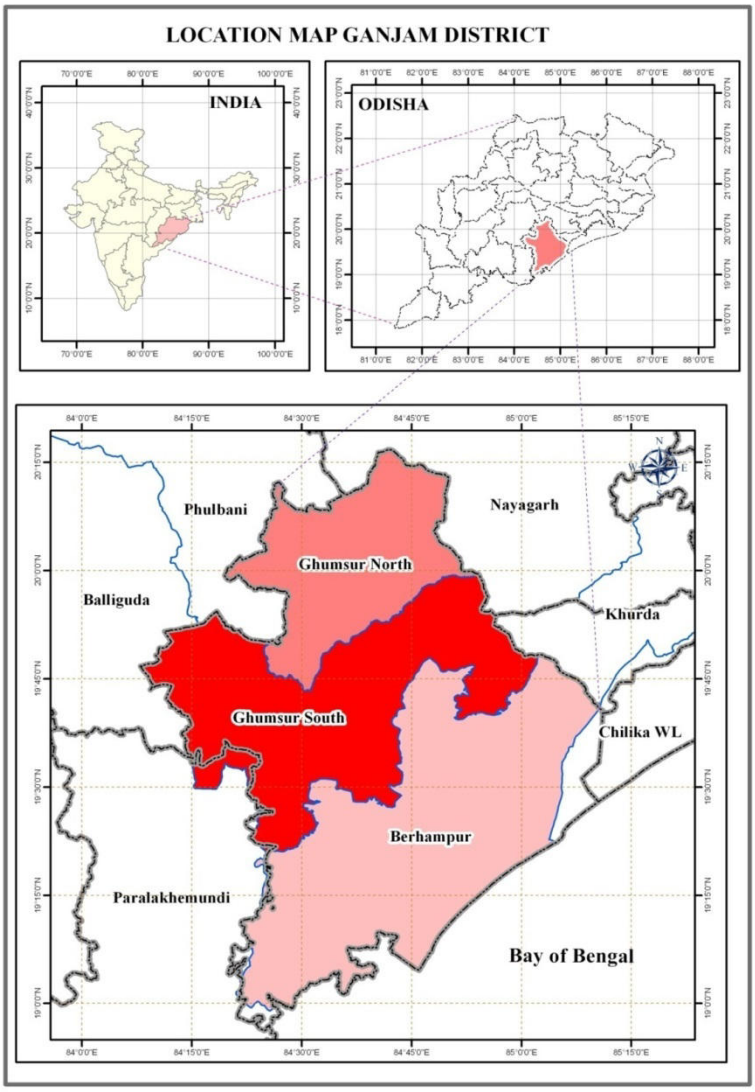


Fig-1-Study area location in India

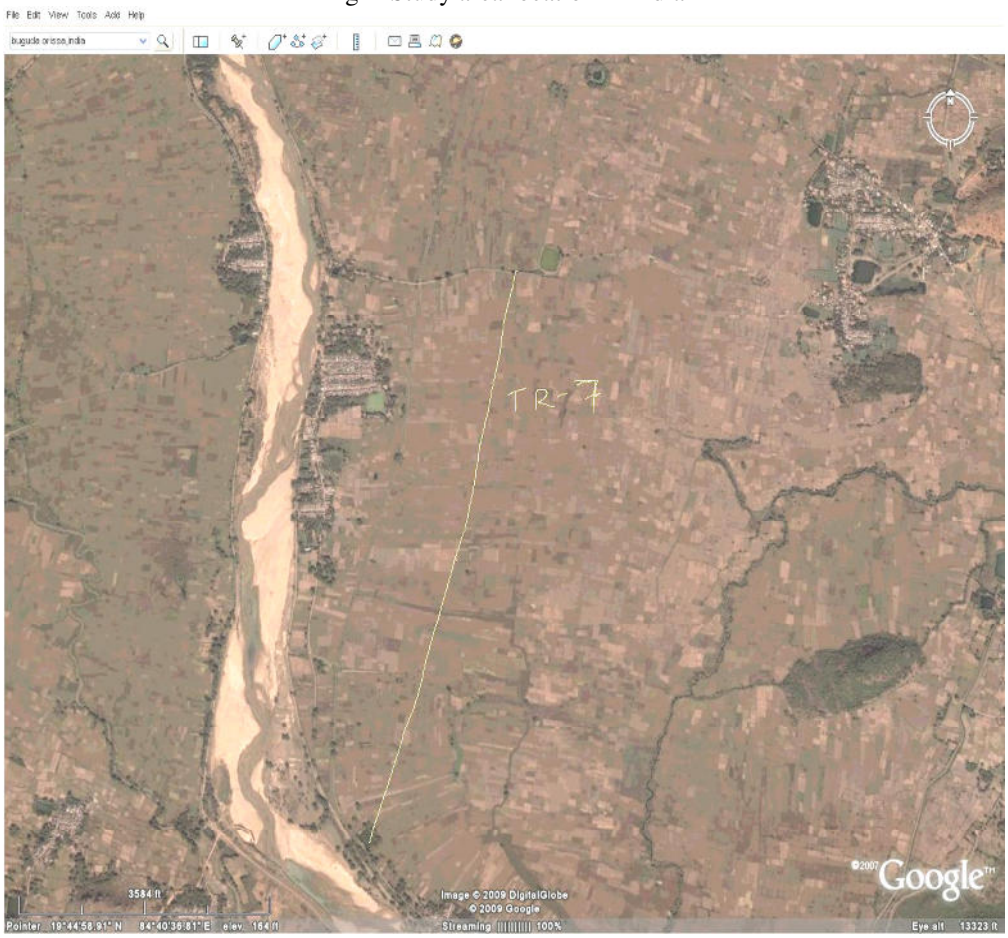


Fig-2 A sattelite immegery of Study area location in Gahangu habitat.

4. Distribution and Status

Presently, a considerable population of this species exists in Andhra Pradesh, Rajsthan, TamilNadu, Gujrat, Madhya Pradesh, Hariyana, Karnataka and Uttar Pradesh. In Bihar and Bengal the populations are insignificant. The total population may be between 5 to 7 thousand. In captivity the species is prolific breeder and its total population in all the zoos and deer parks is around 500- 600 individuals. With private possession the total numbers could be nearly 300 to 400 animals in Uttar Pradesh, Uttarakhand, Rajsthan and Haryana. In Oidsha, considerable numbers around 25 individuals are kept as pet in temples, home premises. Outside India, blackbuck is locally extinct in Pakisthan, Bangladesh. In Pakistan, captive breeding schemes were established in the 1970s with the aim of reintroducing blackbuck in wild. As a result of conservation schemes, a few small captive and semi- captive populations currently exists (Ranjitsinh, 1982). In Nepal, only a few small populations consisting of several tens of individuals currently survive (Dinerstein, 1979).

Photo -4 A complte Herd of blackbuck of different age class in Talaramapalli habitat.

Although native to the Indian subcontinent, considerable numbers of blackbuck are currently found in the U.S.A and Argentina, where they were introduced over 80 years ago , In the U.S.A, blackbuck are mainly found on game ranches in the state of Texas and recent census place their total population in Texas at around 35,000 individuals (Mungall 1978) The habitat utilization and foraging preference depends on the topography of the ground, soil and vegetation pattern and ultimately on the weather conditions of the seasons. Seasonal variation in vegetation including.

Table :1 Line Transects for Blackbuck encounter survey in Buguda, Asika, and Khallikote ranges of Ganjam district (Survey, March 2008) designed by me , U.K. Das,

Transect ID	Range	Beat	Transact Distance	Transect Bearing	Starting place	Ending Place	Start Latitude	Start longitude	End Latitude	End Longitude
TR -1	Buguda	Thanapalli	3	235	Betarasingh pastureland end	Burujhola waterwhole	19.823611	84.780639	19.823611	84.780639
TR -2	Buguda	Thanapalli	2.1	225	B.jhola pwd Road bridge	Belapur Talasakar croplands	19.807167	84.750389	19.807167	84.750389
TR -3	Buguda	Thanapalli	2	80	Kholakhali dam site(SW of Bankeswari	Kanachhai HT line(NW of Mendhakhai Hill)	19.781306	84.749556	19.781306	84.749556
TR -4	Buguda	Thanapalli	2.8	278	Pankalabadi N SH- Road bridge	Manikapur Siva Temple, kalamaba Road	19.769528	84.740083	19.769528	84.740083
TR-5	Buguda	Balipadar	2.4	151	Manikapur-Kalamba Road 3KM pillar	Ekadala-Balipadar PWD Rd canal bridge	19.76575	84.705333	19.76575	84.705333
TR-6	Buguda	Balipadar	2.8	225	Balipadar-College road-PWD Bridge	Namile-Chandanpedi road cannal bridge	19.829972	84.704333	19.829972	84.704333
TR -7	Buguda	Balipadar	3	188	Gahangu-Kalamba mid road pond E turning	Chandanapedi N side pond	19.696194	84.700278	19.696194	84.700278
TR -8	Buguda	Balipadar	2	253	Badakholi – Bhetnoi SH road Ber tree	Tunia nala-badanadi junction	19.697694	84.698333	19.697694	84.698333
TR -9	Asika	Babanapur	2	138	Badakholi – Bhetnoi SH midroad culvert	Towards Narayana pur Watch tower	19.692861	84.695639	19.692861	84.695639
TR-10	Asika	Babanapur	2	300	Bhetnoi college N culverton SH	Sidhanoi GPO across Jagati padia	19.674917	84.692694	19.674917	84.692694
TR-11	Asika	Babanapur	2	105	Bhetnoi college S culverton SH	East side of JK Paper Ltd plantation	19.672667	84.692417	19.672667	84.692417
TR-12	Khallikote	Chikilli	2	335	Khadikahaja SE Ber tree, Talarama Palli	Danapur E site Gahiramala across waterhole	19.325806	84.982111	19.325806	84.982111
TR-13	Khallikote	Chikilli	3	220-230	G- Nuagaon-Jharapalli Rd E side cart road	G-nuagaon-Bedha gahira-Jamun tree(Curved Transect)	19.550861	84.960306	19.550861	84.960306
TR-14	Khallikote	Chikilli	2	220	Chikili-talapada Road Pump house	Barasara E side Gahira Pasture lands	19.576944	85.0135	19.576944	85.0135
TR-15	Khallikote	Purusottam pur	2	187	Sama- sikula Mid road Chakunda tree	South side crop fields across the nulha	19.568083	84.919139	19.568083	84.919139
TR-16	Khallikote	Purusottam pur	2	335	Jaugada-B.kharida Rd N side Culvert	Back of Kaleswar Siva temple of B. Kharida	19.527333	84.764	19.527333	84.764
TR-17	Khallikote	Purusottam pur	2	256	Kusakata dhepa Pasture land e of Jarada village	East of Jhadabai village pond site Chakunda tree	19.540528	84.816194	19.540528	84.816194
TR-18	Khallikote	P.S Pur(be trensfer to Asika R.	2	345	Gaudadhepa cart road left side babool tree	North side crop fields across a nulha cement work	19.587	84.766583	19.587	84.766583
TR-19	Khallikote	P.S Pur(be trensfer to Asika R.	2	75	E. of Asika Sugar mill JKP plantation,	Humuki village N ber tree across waterbody	19.6255	84.685778	19.6255	84.685778

Except the above 19 transects some more transects having sparcly distributed blackbuck in the habitats may be drawn in the far areas to past presence of the habitat in Suramani area (north –west of Balipadar) in Buguda , far eastern patch was recorded in Khandadeuli village sites close to Humma of Khallikote Range and further

north in Kumpapada- Lunidhepa area (North of Panchubhuti) under Udayapur beat of Bududa range

TABLE-2

Census history of Blackbuck in Ballipadar-Bhetnoi wildlife reserve, associated area of Ghumusur south forest division and Berhampur forest division .

Sl no	Census year	Male	**Percntage**	Female	**Percntage**	Young	**Percntage**	Total	Sex ratio M:F
1	1973	152	29.06%	302	57.74%)	69	13.20%	523	1:2.0
2	1980	129	26.60%	284	58.60%	72	14.80%	485	1:2.2
3	1998	94	17.06%	376	68.24%	81	14.70%	551	1:4.0
4	2004	212	27%	487	62%	87	11%	786	1:2.3
5	2006	306	27.79%	664	60.30%	131	11.89%	1101	1:2.16
6	2008	386	23.08%	1107	66.20%	180	10.76%	1672	1:2.86

Figures in the %age column indicates percentage (%) of animal groups out of total population

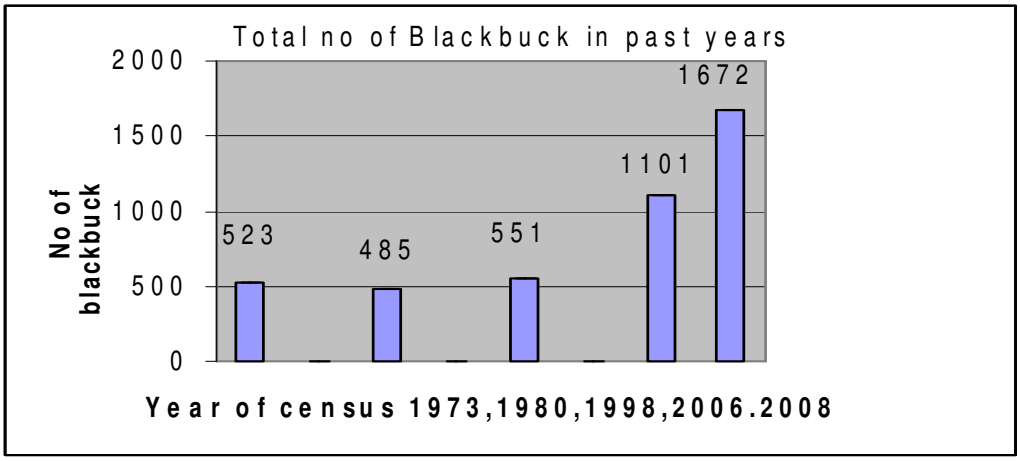


TABLE-3

AREA / UNITWISE CENSUS RESULT *(MARCH 1998)*

Area/Units	**Male**	**Female**	**Young**	**Total**	**M:F ratio**
Betarsingh	06	32	01	39	1:5.33
Subudhipalli	12	42	08	62	1:3.5
Ramunda	05	06	03	14	1:1.2
Kholakhali	19	63	17	99	1:3.3
Balipadar / Gahangu	17	79	12	108	1:4.64
Badakholi	09	49	16	74	1:5.44
Pandipathar	08	49	12	69	1:6.12
Karasingha	07	15	02	24	1:1.1
Purusottampur	09	32	08	33	1:3.5
Thanapalli / Nagiri	02	09	02	13	1:4.5
TOTAL	**94**	**376**	**81**	**551**	**1:4**
PERCENTAGE	**17.06%**	**68.24%**	**14.7%**	**100%**	

TABLE-4

Unit wise census results for blackbuck in different forest ranges in Ganjam district. ,year 2006 Buguda Range

Unit no	Place/ village sides	Male	Female	Young	Total
1	Bhamasali	2	8	0	10
2	Chadiapalli				
3	Nagiri	2	11	0	13
4	Thanapalli				
5	Motabadi				
6	Kanasuka	2	10	3	15
7	Bethiabarada				
8	Talasakar				
9	Dakarabadi				
10	Pankalabadi	3	1	0	4
11	Tikarapada				
12	Sapuapalli				
13	Solundi	2	7	0	9
14	Kanjiapalli				
15	Subudhipalli				
16	Golabandha	1	3	1	5
17	Betarasingh				
18	Gholapur	0	0	0	0
19	Chilikhama				
20	Sankuru				
21	Buguda NAC	0	0	0	0
22	Ramunda	11	22	3	36
23	Burujhola				
24	Golamundula				
25	Udayapur	4	7	2	13
26	Panchubhuti				
27	Kumpapada				
28	Lunidhepa				
29	Kanachai	17	25	5	47
30	Dhanicha				
31	Bejiput				
32	Samantarapur	0	0	0	0
33	Pandiapathar	5	7	2	14
34	Badakholi	0	0	0	0
35	Sanakholi	0	0	0	0
36	Gahangu	28	116	4	148
37	Dehuka				
38	Kalamba				
39	Kadapada				
40	Ramagarh	6	13	4	23
41	Dengapadar				
42	Bishnuchakra				
43	Suramani	10	16	1	27
44	Jatrasuni				
45	Banka				
46	Indragada				
47	Jiliva				
48	Balipadar	35	65	11	111
49	Phapalpur				
50	Danachandanpedi				
51	Ekadala	5	2	3	10
52	Sadasivapur Sasan	0	0	0	0
53	Jholari	4	6	2	12
54	Manikapur	14	28	8	50
55	Dasipur	3	7	1	11
56	Sunakera	0	0	0	0
57	Antarapada	6	15	0	21
58	Kandha Chanapedi				
59	Ghodapada				
60	Kanchuru	6	15	0	21
61	Kanchuru Patana				
62	Belapur				
63	Manibandha				
64	Mahulapalli				
Total for Buguda Range		**176**	**391**	**54**	**621**

Aska Range

1	Brahmana Bagada				
2	Naika Bagada	11	11	8	30
3	Bhetnoi				
4	Mordia				
5	Gahiamala	15	58	10	83
6	Kania				
7	Badhia				
8	MLA Bunglow	11	12	1	24
9	Sidhanoi				
10	Banabali	27	42	22	91
11	Chancharamala				
12	Babanapur				
13	Kharia				
14	Sabapur				
15	Dumukei	26	36	3	65
16	Humuki				
17	Sidha Nuapali				
Total for Aska Range		**90**	**159**	**44**	**293**

Polasara Range

1	Siali	3	9	4	16
2	Nuakharida	0	0	0	0
3	Purunakharida	0	0	0	0
Total for Polsara Range		**3**	**9**	**4**	**16**

Khallikote Range

1	Chikili	4	10	1	15
2	Talapada	4	19	3	26
3	Gopapur	0	0	0	0
4	Pustapur	1	1	1	3
5	Ambajhari/Nuagaon	4	14	7	25
6	Bania				
7	Gauda Nuagaon	2	4	0	6
8	Jarada	7	24	12	43
9	K.Barida	2	2	0	4
10	Sama/ Sikula	6	12	2	20
11	Kabisuryanagar				
12	Jenadhepa	5	14	3	22
13	Komanda	2	5	0	7
Total for Khallikote Range		**37**	**105**	**29**	**171**

TABLE-5

Abstract of Grand total for Black buck Census 2006 Ganjam district

Sl no	Range Name	Male	**%age**	Female	**%age**	Young	**%age**	Total	Sex RatioM:F
1	Buguda	176	28.34%	391	62.96%	54	8.69%	621	1:2.22
2	Aska	90	30.71%	159	54.26%	44	15.01%	293	1:1.17
3	Polasara	3	18.75%	9	56.25%	4	25.0%	16	1:3
4	Khallikote	37	21.63%	105	61.40%	29	16.95%	171	1:2.83
Grand Total		**306**	**27.79%**	**664**	**60.30%**	**131**	**11.89%**	**1101**	**1:2.16**

TABLE-6

Details of unit wise census results for blackbuck in different 4 forest ranges in Ganjam district. Year 2008 (April 17th and 18th)

Buguda range

Unit no	Name of the village side units	Coverage area / villages	Male	Female	Young	Total
1	Solundi	Solundi, kanjiapalli, subudhipalli	02	20	01	23
2	Golabandha	Golabandha, Betarsingh	01	03	0	04
3	Ramunda	Ramunda, Burujhola, Golamundula,kanachhai, Kholakhali, Belapur	05	54	17	76
4	Nagiri	Nagiri,Thanapalli, Motabadi	03	13	04	20
5	Bhamasali	Bhamasali,Chadiapalli	01	03	02	06
6	Bethiabarada	Bethiabarada, Kanasuka, Dakarabadi,Talasakar	03	11	02	16
7	Pangidi	Pangidi, Belapur	04	15	02	21
8	Antarapada	Ekadala,Jholari,Manikapur K.Chandanapedi,Antrapada, Kanchudupatana	13	33	11	57
9	Pankalabadi	Pankalabadi, Tikarapada, Sapuapalli	02	11	02	15
10	Kalamba	Kalamba,DasiPur,Kadapada Sadasivpur	01	28	0	29
11	Ramagada	Ramagada,Bishnuchakra Dengapadar,Ghodapada	23	30	0	53
12	Suramani	Suramani,Jatrasuni,Indragada,Jiliva, Banka	15	34	09	58
13	Gahangu	Gahangu,Dehuka,Phapalpur, Balipadar	25	127	06	158
14	Dhanija	Dhanija,Samantarapur,Badakholi Sanakholi,d.Chandanapedi	11	56	04	71
15	Pandiapathara	Pandiapathara, Bhejiput	15	14	18	49
16	Udaya pur	Udayapur,Panchubhuti,Ki\umpapada Lunidhepa	01	05	01	07
Total for Buguda Range			**125**	**459**	**79**	**663**

Polasara range

Unit no	Name of the village side units	Coverage area / villages	Male	Female	Young	Total
1	Siali	Siali,Nuagaon, Purunakharida	05	17	0	22
2	Samantarapalli	Samantarapalli, Nanchunipada	01	05	01	07
Total for Polasara Range			**20**	**53**	**0**	**73**

Asika range

Unit no	Name of the village side units	Coverage area / villages	Male	Female	Young	Total
1	BrhamanaBagada	Brahmanabagada,Nayakbagada	27	53	0	80
2	Bhetnoi East	Khariamala,Gahiramala Kannkaradeba	22	34	03	59
3	MLA Bunglow	MLA Bunglow,Bajrakote Dasanapalli	19	58	02	79
4	Bhetnoi Medical	Ratnasagar,Pujaribagada Sampana	4	20	02	26
5	Sidhanoi	Sidhanoi, Banabali,Chanchara-Mala, Jagatipadia,Watchtower-	15	8	3	26
6	Golapalli	Golapalli,Babanapur,Humukei Karia,Bania	5	11	2	18
7	Dasanapalli/ Bhetnoi West	S.Poli,saapur	10	20	3	33
8	Pandia- Moradi/ Bhetnoi Central	Bhetnoi,Marudia,Badhia,Gahiramala, Kania	28	55	05	88
Total for Asika Range			**130**	**259**	**20**	**409**

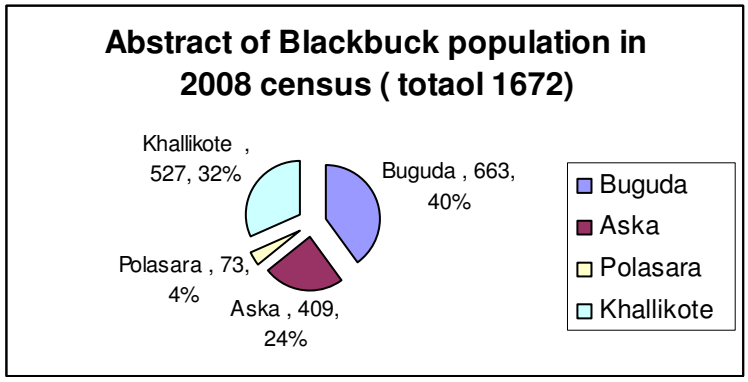
Khallikote range

Unit no	Name of the village side units	Coverage area / villages	Male	Female	Young	Total
1	Gouda-.Nuagaon	Gauda Nuagaon and Periphery area	09	31	04	44
2	Komanda	Komanda and periphery area	12	28	0	40
3	Ambajhari	Ambajhari and Periphery area	04	13	04	21
4	Chikili	Chikili and Periphery area	27	38	10	75
5	Bania	Bania, Nahunibandha	05	15	09	29
6	Talaramapalli	Talaramapalli N,Dengapada S Danapur W,batarapalli W, RanipadaN Saintabada E Barasara SE	28	65	05	98
7	Jarada	Jarada villageand Periphery area	12	35	7	54
8	Jaugada	Jaugada and Periphery area(N) NE area	05	18	0	23
9	Sama	Sama, Sikula and its periphery areas, N of Purusottampur East side of Bhatakumarada	15	14	0	29
10	Jenadhepa	Jenadhepa,Kantabagada, and NW area of Kabisurya nagar	05	25	0	27
11	K.Barida-Humuki	Ghatakauli ,K.Barida east of Sugar Factory ,JK plantationarea	12	75	0	87
Total For Khallikote Range			**134**	**354**	**39**	**527**

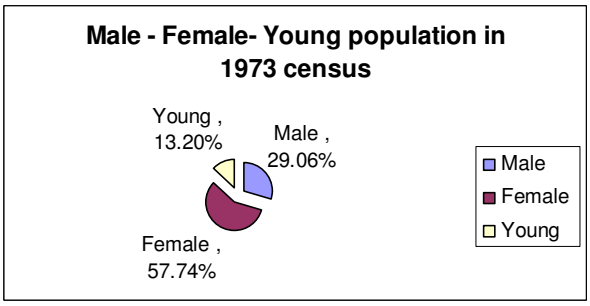
TABLE-7

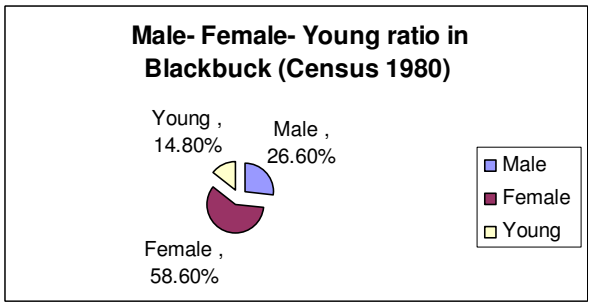
Abstract of Grand total for Black buck Census April , 2008 Ganjam district

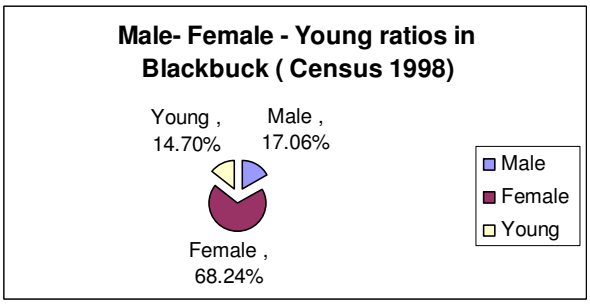
Sl no	Range Name	Male	**Percentage**	Female	**Percentage**	Young	**Percentage**	Total	Sexratio M:F
1	Buguda	125	**18.85%**	455	**68.62%**	83	**12.51%**	663	1:3.64
2	Aska	130	**31.78%**	259	**63.32%**	20	**4.88%**	409	1:2
3	Polasara	20	**27.39%**	53	**72.60%**	00	**0%**	73	1:2.65
4	Khallikote	111	**21.02%**	340	**64.39%**	77	**14.58%**	527	1;3.06
Grand Total		**386**	**23.08%**	**1107**	**66.20%**	**180**	**10.76%**	**1672**	**1:2.86**

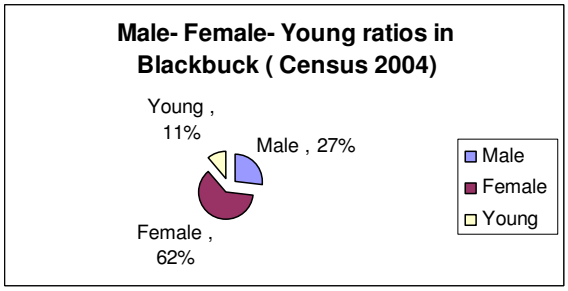


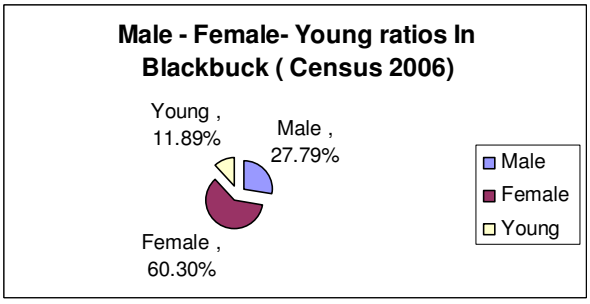
Figurers showing pie charts in the male –female- young sex ratios in Ganjam districts in different years

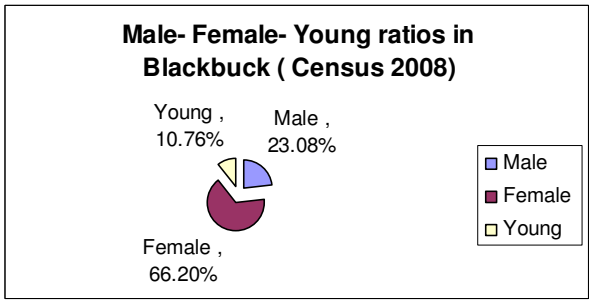












Census years are 1973,1980, 1998, 2004, 2006 and 2008 and conducted by Forest department with active participation of local people and institutions

5. Animal dispersal and Population dynamics in blackbuck herds.

There were scattered populations of blackbuck in the Balipadar-Bhetnoi w ildlife reserv e of Ganjam district prior to 1990. The population w as confined to the Babanpur area and Bhetnoi gahira (Low laying crop fields) after the flooding in the Asika region in 1992. The blackbuck population dispersed to the northern of the habitat tow ards Balipadar and subsequently reached at Ramunda area close to Buguda tow n during 1998 survey. Some population in Purusottampur area dispersed to Talarampalli area near Krishnagiri hill and the present population reached at the eastern frontier of the Khandadeuli region (a distant of 5 km) from the Humma tow n close to sea coast. The distribution during 2008 w as found to be 5 times more than the distribution during1998. Formation of new blackbuck habitat occurred since 1998. Both the population and coverage area enhanced year to year. There w ere about551 blackbuc ks dur ing the start ing of researchproject i.e. February 1998 and the number furtherrose to 1672 by April 2008 .Blackbuck population recorded during March1998w as less than the present census of 2008 . Duringcensus 1998, Buguda and Askarange cover 85%of blackbuck population, Rest of the area under Khallikote range, Purusottampur area and Jarada -Jauguda area of Polasara range cover only 15 % ofthe population. Only the Buguda range have 60% ofblackbuck population of the district.But the present census (2008) survey that the Khallikote range population is around 32% of thetotal population of the district.

COMPARISON OF GROUP SIZE OF BLACKBUCK IN DIFFERENT SEASONS

Winter Season (November to February)

S. No.	**Group types**	**Group size Ranges**					**TOTAL**
		1	2	3-9	10-19	> 20	all group size ranges
1.	All male groups	(Maximum observed size = 11)					
	No. of groups	43	2	7	1	0	53
	Total in each group size	43	4	33	14	0	94
	% group range	81.1	3.8	13.2	1.9	0	100%
2.	Harems	Maximum observed size = 26					
	No. of groups	0	9	19	14	3	45
	Total in each group size	0	18	123	186	70	397
	% group range	0	20	42.2	31.2	6.6	100%
3.	Mixed groups	(Maximum observed size= 37)					
	No.of groups	0	0	3	6	2	11
	Total in each group size	0	0	12	70	58	140
	% group range	0	0	27.3	54.4	18.3	100%
4.	All female groups	Maximum observed size = 27					
	No.of groups	1	1	0	0	1	3
	Total in each group size	1	2	0	0	27	30
	% group range	33.3	33.3	0	0	33.4	100%

Summer Season (March - June) ranges (Number of individuals)

S. No.	Group types	Group size			Ranges		TOTAL
		1	2	3-9	10-19	> 20	all group size ranges
1.	All male groups	Maximum observed size = 14					
	No.of groups	21	2	8	0	0	31
	Total in each group size	21	4	38	0	0	63
	% group range	67.8	6.4	25.8	0	0	100%
2.	Harems	Maximum observed size = 26					
	No. of groups	0	7	18	13	3	41
	Total in each group size	0	14	97	171	71	353
	% group range	0	17	44	31.7	7.3	100
3.	Mixed group	(Maximum observed size = 42					
	No.of groups	0	0	9	8	34	21
	Total in each group size	0	0	62	109	119	290
	% group range	0	0	42.3	38	19	100%
4.	All female group	Maximum observed size = 19					
	No.of groups	4	0	3	1	0	8
	Total in each group size	4	0	14	11	0	29
	% group range	50	0	37.5	12.5	0	100

Rainy Season (July - October)

Group types Group size ranges (Number of individuals)

S. No.	Group types	Group size			Ranges		TOTAL
		1	2	3-9	10-19	> 20	all group size ranges
1.	All male groups	Maximum observed size = 10					
	No.of groups	10	2	4	1	0	17
	Total in each group size	10	4	16	10	0	40
	% group range	58.9	11.7	23.5	5.8	0	100
2.	Harems	Maximum observed size = 13					
	No.of groups	0	0	8	8	0	16
	Total in each group size	0	0	49	95	0	144
	% group range	0	0	50	50	0	100
3.	All female groups	Maximum observed size = 6 Occasional congregation in high pasture fields= 23					
	No.of groups	2	0	0	0	0	2
	Total in each group size	2	0	0	0	0	2
	% group range	100	0	0	0	0	100

6. Discusions

All the Observations done in the different identified habitats in Buguda, Asika and Khallikote Ranges. The habitats were monitored even by walking and through bicycle in a routine manner for about 8 years with help of binoculars. How ever there is temporary assemblage of blackbuck individuals of different age groups in restricted forage ground in rainy days and vast open post harvested cropland during winter. The blackbuck herds even reached up to 92 individuals with 4-6 adult males in a congregated herd in Gahangu (Buguda range), Bhetnoi (Asika range) and Talaramapalli (Khallikote range) habitats. A highest of 11 numbers of all male blackbuck of different ages forming a single bachelor herds was seen in Babanpur area close to Jagati Pasture land of Bhetnoi village. In another instance at Talaramapalli habitat a group of 13 males was seen north of Talaramapalli village near Jhadeswar shrine under Khallikote range (Das & Kar, 2011).

Acknowledgements
Firstly our sincere gratitude goes to Sri Saroj KumarPattnaik, IFS, Ex -Pr incipal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden, Orissa,who entrusted me as a researcher in the Blackbuck research Project in Balipadar-Bhetnoi area of Ganjam district. I am thankfull to Sri S.S Srivastava, IFS, Chief Conservator of Forests (Wildlife) , Odisha who apriciated my work. My thanks also gone to the credit for sincere co-operation of Sri S.K Acharya , IFS, former, DFO , Ghumusar South division during the first phase and Mrs Uma Nanduri , IFS, and Sri A.K Jena , IFS ,DFO, in the s econd and third phase of the researchw ork. We are thankful to the supporting field staff of Buguda, Asika and Khallikote ranges for facilitating and proper co- ordination in research work.

References

Chouhan, D.R. (1984), "Female blackbuck with horns" *J. Bombay Nat. Hist. Soc.*, 82(1):188.
Das, U.K; Kar, S.K. (2011), "Study on habitat use and foraging pattern of blackbuck (*Antilope cervicapra*) in Balipadar- Bhetnoi blackbuck reserve, Ganjam district, Odisha, India", *Journal of Organisation for Protection of Ecosystems, Environment and Endangered Species. E- Planet ,Volume-9 Issue-2 July-2011*. 42-49.
Dinerstein, E. (1979), "An ecological survey of the Royal Karnali- Bardia wildlife Resreve, Nepal Part- II: Habitat / animal interactions" . *Biolo. Conserv*. 16: 265-300.
Dharmakumarsinhji, R.S. and Gaekwad, S.F. (1958), "The blackbuck*", Indian board for Wildlife,* 4.
Groves, C.P. (1980), "A note on geographic variation in the Indian blackbuck", *(Unpublished)*
Kar, S.K. (2000), "Study on population, habitat preference, feeding and survival of blackbuck (*Antilope cervicapra*) in Balipadar-Bhetnoi wildlife reserve of Ganjam district, Orissa", *Final Technical Report submitted to the Ministry of Environment & Forest (RE Section). Government of India*. pp. 1-52
Prater, S.H. (1971), "The book of Indian animals", Bombay Natural History Society, Bombay, 270-324..
Kar, S.K. (2000), "Survival of blackbuck, *Antilope cervicapra* in Ganjam district of Orissa: an epitome of human-animal interaction", *The Twilight - Journal of Pugmarks, Kolkata,* 2(2-3) : 28-30.
Prater, S.H. (1990), "The book of Indian Animals" , Bombay Natural Histroy society , Oxford University Press, Bombay, 270 – 271.
Mungal, E.C. (1978), " The Indian Blackbuck Antelope", *A Texas view. Klebreg studies in Natural Resources. The Texas A &M Univ. Setem; College Station Texas,* 184e
Ranjitsinh, M.K. (1982), " Ecology and behavior of the Indian blackbuck (*Antilope cervicapra* Linn.17580 in Velvadar National Park, Gujarat", *J. Bombay. Nat. Hist. Soc.* 79, 241-246.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar