BIODIVERSITY AND ECOLOGICAL ANALYSIS OF TAL CHHAPAR SANCTUARY, CHURU (RAJASTHAN)

SUMMARY

2017

MINOR RESEARCH PROJECT

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SUMMARY

India is one of the 17 mega diverse countries of the world. With only 2.4 percent of the world's land area, 17.7 percent of the world's human population and 18 percent livestock, it contributes about 8 percent of the known global biodiversity, however, putting enormous demands on our natural resources. India is known for its rich heritage of biodiversity. It is one of the recognized mega diverse countries of the world. With an area of about 329 mha, India is seventh largest country in the world. So far, 45,968 species of plants and 91,364 species of animals have been documented. At the global level, 2,78,900 species of microorganisms have been described so far, out of the estimated 3.75 million extant species. The varied edaphic, climatic and topographic conditions have resulted in a wide range of ecosystems and habitats such as forests, grasslands, wetlands, coastal and marine ecosystems, and deserts which in turn have contributed to immense biological diversity with large variation in species of plants, animals and microbes. Conserving biodiversity is basic to our survival and well-being and using it sustainably, forms part of the Indian culture and lifestyle. Biodiversity and ecosystem services provided by it contribute to poverty eradication and national development.

Study Area:
Churu the district headquarters is situated in the north eastern part of Rajasthan where mostly desertic conditions are prevailed. It is covers an area of 6.94 square km. and having population of 2,041,172 as per Census 2011. This district falls in the desert tract known as 'Thar'. The sanctuary lies in the Sujangarh Tehsil which is located in the north eastern part of the Thar desert at a latitude 27° 42' north and longitude 74° 20' east at a height of about 286.6 meters from mean sea level. The sanctuary lies on Nokha-Sujangarh state highways at a distance of 85 km. from Churu, 160 km. from Bikaner and 200 km. from Jaipur. Tal Chhapar Sanctuary is located in the Churu district of north western Rajasthan in the Shekhawati region of India. The nearest railway station is Chappar which lies on Degana-Churu-Rewari broad gauge line of north western railways. It is known for black bucks and is also home to a variety of birds.

The Tal Chhapar sanctuary is located on the fringe of the Great Indian Desert. Tal Chhapar nestles a unique refuge of the most elegant Antelope encountered in India, the 'Black buck'. Tal Chhaper sanctuary, with almost flat tract and interspersed shallow low lying areas, has open grassland with

scattered Acacia trees which give it an appearance of a typical Savanna. The word 'Tal' means plane land. The rain water flows through shallow low lying areas and collect in the small seasonal water ponds. It lies on the way of the passage of many migratory birds such as harriers. These birds pass through this area during September. Birds commonly seen in the sanctuary are harriers, Eastern Imperial Eagle, Tawny Eagle, Short-toed Eagle, sparrow, and Little Green Bee-eaters, Black Ibis and Demoiselle Cranes, which stay there till March. On the other hand, skylark, crested lark, Ring Dove, brown dove and blue jay are seen throughout the year.

Tal Chhapar Sanctuary:

Total area of this black buck sanctuary is of 797 hectare which lies on both side of Chhapar-Sujangarh road. It is surrounded by Gopalpura, Tal Chhapar (Town), Charwas, Soorwas, Dewani, Rampura villages. In the Tal Chhapar Sanctuary, a special type of grass is found. This grass is called *Mothiya* locally. The word 'Mothiya' comes from the word 'Moti' or from the English word for Pearl. The shape of the seed of this grass is like very fine round shaped pearls. Mothiya has a very sweet taste. People enjoy eating it, but it is found in very small quantities. Production is only a few kilograms every season. Mothiya is also food for Black bucks and other birds which dig it from earth with their Starks. The Tal Chhapar was declared 'Reserved Area' for the protection of wild animals and birds in 1962. Over 2492 black bucks are found in almost tree less saline flat land of Tal Chhapar sanctuary. This is a natural home of black bucks. The main problems of the area are as follows:

1. Cutting of trees and degradation of forest.
2. Uncontrolled grazing.
3. Manmade element such as road, building watch hut etc.
4. Hunting of animals.
5. Developments around sanctuary.
6. Lack of infrastructure facilities like drinking water for animal, proper feeding.

Objectives:

The objectives of the present study are as follows:

i. To assess the habitat conditions of the area in regard to its terrain, physiographic, climate and soil for such factors influence the ecology of the plants and animals.

ii. To study the spatial distribution patterns of plant communities in respect to the varied relief of the area.

iii. To analyze the spatial distribution patterns of black buck in respect to the terrain a plant cover which is so varied in this area.

iv. To suggest strategies for the ecological management plan for protection and conservation of biodiversity of this arid region.

Hypothesis:

Increasing of population, industrialization and urbanisation are adversely affecting the natural vegetation and animal life of this region. Consequently, the main reason of the depletion of black buck life is the continuous decreasing feeding capacity of this fragile desert region. Therefore, the proposed ecological study of Tal Chhapar is an attempt to test the hypothesis that the continuous increasing demographic pressure and development activities are the major factors for loss of biodiversity of wild life sanctuary ecosystem.

Methodology:

In order to make the study comprehensive and more analytical, both empirical and statistical methodologies have been applied for different aspects of the study. The present work has been conducted with the following methods:

1. Available reference material, reports, statistical data and maps.
2. Collected primary data through sample field survey and personal observation in surrounding village of Tal Chhapar sanctuary.
3. Interview through questionnaire in which the questions were framed specially to study the population, environment and development issues. For this 15 sample villages have been studied. The selection of villages was based on surrounding Tal Chhapar sanctuary village.
4. At the micro level the study has been done on the basis of questionnaire by personal interview method with the villager and farmers. About 25 percent of household were interviewed from each village. Thus 2000 respondents were interviewed in all 15 villages.
5. Secondary data collected from District Census Handbook, Churu, Statistical Abstract of Churu district, and other basic information of the area from different reports and published materials.

Thematic Chronology:

The present study has been divided into six chapters, each dealing with different aspects of the study. The first chapter briefly describes the objectives of the study, hypothesis, methodology and review of literature and study area of the study. The second chapter briefly described the existing physical character of the area like location and extent, physiographic, drainage, soil, climate, land use water resources and historical background of the district. In the third chapter briefly described the demographic profile of selected villages of the study area has been studied on the basis of certain development indices like population growth, literacy, caste system, sex ratio and occupational structure. The chapter four describes about the ecological profile

of the sanctuary area. The chapter fifth explains about the field study result. In this chapter details field observation has been given with table and its description. The last chapter is on conclusion and suggestions which describes the main findings of the study and also bring out the main problem of the study area. A strategy has been worked out as a suggestive measure for improving the black buck management and quality of life. A number of suggestions have been made like fodder management, water management etc.

Population Trend of Black Bucks:

The data from 2005-06 to 2015-16 was procured and various general parameters were calculated. It is interestingly that overall Blackbuck population was 1680 heads in 2005-2006 which have been reached up to 2492 heads in 2015-16. The data suggests that almost every year population is increasing. It is estimated that percentage growth of Blackbuck is about constant in two years that is 4.38 in 2008 and 4.35 in 2009. The details are given as below.

Table 1: Population of Blackbuck, 2005-06 to 2015-16

Year	Male	Female	Fawn	Total
2005-06	589	853	238	1680
2006-07	665	818	280	1763
2007-08	660	820	267	1747
2008-09	669	835	323	1827
2009-10	692	876	342	1910
2010-11	711	904	408	2025
2011-12	757	842	457	2206
2012-13	905	862	444	2311
2013-14	764	1174	455	2393
2014-15	846	1166	423	2435
2015-16	867	1191	434	2492

Source: Tal Chhapar Black Buck Sanctuary

Perception of Villagers

There has been increasing realization that forests provide numerous benefits to mankind including improvement of the quality of environment. Forests provide goods and services and maintain life support systems like timber, fuel wood, fodder, and a wide range of non-timber products. Further, forests are a source of natural habitat for biodiversity and repository of genetic wealth; provide means for recreation and opportunity for eco-tourism. In addition, forests help in watershed development, regulate water regime, conserve soil, and control floods. They contribute to process of carbon sequestration and act as carbon sink, which is important for reduction of greenhouse gases and global warming. In ecologically sensitive areas like mountains, as well as river

catchments, forests play an important role for prevention of floods etc. Degradation of forest resources has a detrimental effect on soil, water and climate, which in turn affects human and animal life. This has created global concern for protection and preservation of forests. It is important to recognize that the benefits of natural forests are rather different than man-made forests. The ecological benefits of natural forests are difficult to replicate in a man-made forest. Functions like carbon-sequestration, would depend on topography, soil conditions, density of forests, etc. The functions of forests both for the natural system as well as the social dimensions can be briefly seen in the following statement. It may be mentioned that while natural forests provide for all these functions, only some of these benefits may arise from man-made forests.

Population of Surveyed Villages:

The detailed survey was conducted in all 15 villages of the sanctuary area nearby village. Total population in all 15 villages is 42946. Out of which 21824 are male and 21122 are female. The numbers of household are 6981 in all 15 villages. The highest populated village is Chadwas i.e. 6945 persons. The lowest populated village is Bidas i.e. 401 persons. The following table shows the population structure of surveyed villages.

Table 2: Population of Surveyed Village of Sujangarh Tehsil, 2011

#	Village Name	Total population	No. of Households
1.	Benath Umji	710	110
2.	Benatha Jogliya	2130	341
3.	Bidas	401	65
4.	Bothiyabas	1679	276
5.	Chadwas	6945	1204
6.	Dewani	1851	315
7.	Dhatri	3169	523
8.	Dunkar	3790	529
9.	Gopalpura	6156	983
10.	Jaitasar	5631	943
11.	Jogliya	5203	798
12.	Rampur	1295	212
13.	Randhisar	2734	481
14.	Soorwas	863	143
15.	Upadhiya	389	58
		42946	6981

Source: Collected from Gram Panchayat Office.

Local Climate Suitability:

The following table shows the local climate suitability for black bucks. The total numbers of respondents were 2000 from 15 village of Sujangarh tehsil.

Most of villages are situated surrounding the sanctuary. About 69.50 percent male and 54.70 percent female respondents reported that local climate is suitable for black bucks. Whereas 12.90 percent male and 16.40 percent female respondents reported that local climate is not suitable for black buck. On the other hand 17.60 percent male and 28.90 percent female were reported that they don't know about the climate suitability for black bucks. If we go for total respondents response it comes 62.10 percent male are positive, 14.65 percent respondents are negative and 23.25 percent respondents don't have any idea about the climate suitability for black bucks. It is clear from the table that 62 percent people are aware about the climate suitability. But 23 percent respondents were didn't know about the climate suitability for black bucks. Even they were not able to link between black buck and climate suitability.

Table 3: Local Climate Suitability for Black buck

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	695	547	1242	69.50	54.70	62.10
No	129	164	293	12.90	16.40	14.65
Don't Know	176	289	465	17.60	28.90	23.25
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Physiography Suitability:

The following table shows physiography suitability for black bucks in the sanctuary. About 58.30 percent respondents reported that physiography is suitable for black bucks in the sanctuary area. Whereas 15.50 percent said that physiography is not suitable for the black buck. On the contrary 26.20 percent respondents reported they don't know about the physiography suitability for black buck. Whereas if we compare male and female responses it is noticed that female members of this area are less aware than male members.

Table 4: Tal Chhapar Physiography Suitability for Black buck

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	689	477	1166	68.90	47.70	58.30
No	172	138	310	17.20	13.80	15.50
Don't Know	139	385	524	13.90	38.50	26.20
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

People's Awareness about Notified Black buck Sanctuary:

The table shows about people's awareness about notified black buck sanctuary by government. About 67.70 percent male and 17.80 percent female respondents were aware about notified area of Tal Chhapar sanctuary. About 14.50 percent respondents don't know government notification. It is clear from the table that female members are less aware about the government notification but male members are more aware about government notification.

Table 5: People's Awareness about Black Buck Sanctuary by Government

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	732	622	1354	73.20	62.20	67.70
No	173	183	356	17.30	18.30	17.80
Don't Know	95	195	290	9.50	19.50	14.50
Total	1000	1000	2000	100.0	100.00	100.0

Source: Based on field survey

Knowledge about types of Plants in Sanctuary Area:

The data reflects about the people's knowledge regarding different kinds of plants available in the sanctuary area. About 67.70 percent respondents reported that they are well known about the plants available in the sanctuary area. The male and female are both very well aware about the plants available in the sanctuary area. Whereas 23.80 percent respondents don't know the variety of plants available in the sanctuary area. Apart from this 8.50 percent respondents reported that they don't know anything about this.

Table 6: Knowledge about types of Plants in Sanctuary Area

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	721	633	1354	72.10	63.30	67.70
No	214	262	476	21.40	26.20	23.80
Don't Know	65	105	170	6.50	10.50	8.50
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Increasing Black Buck Population:

The following table depicts about the increasing number of black bucks in the sanctuary. In this regard the results are very specific. About 44.75 percent respondents said those populations of black bucks are increasing. Whereas 30.10 respondents thought that black bucks population are not increasing. On the contrary 25.15 percent respondents have no idea about the increasing black buck population.

Table 7: Increasing Black Buck Population

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	498	397	895	49.80	39.70	44.75
No	364	238	602	36.40	23.80	30.10
Don't Know	138	365	503	13.80	36.50	25.15
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Spatial Terrain affects the freely walking of Black Buck:

The spatial terrain also affects the freely walking of black buck in the sanctuary area. The following table shows the respondents related to free walking of black buck in the sanctuary. About 28.90 percent respondents reported that the terrain of the area affects the free movements of the black buck. Whereas 38 percent respondents reported that the terrain of the area don't affects the free movement of the black buck. Apart from this 33.10 percent respondents point out that they don't have any idea about this. It may be affected or may not be affected the free movement of the black buck in the sanctuary area. The details are given in the following table.

Table 8: Spatial Terrain affects the freely walking of Black buck

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	346	232	578	34.60.	23.20	28.90
No	368	392	760	36.80	39.20	38.00
Don't Know	286	376	662	28.60	37.60	33.10
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Sufficient Greenery:

The greenery is basic requirement of the any wild life ecosystem. Without sufficient greenery wild life ecosystem will not survive naturally. The following table shows sufficient greenery available in the sanctuary. About 39.05 percent respondents reported that the greenery is sufficient for the sanctuary's wild life. On the other hand 40.60 percent respondents reported that the greenery is not sufficient for wild life. It should be increased in a proper manner as per local environment and need. Especially in the summer season these black buck of the sanctuary faces many severe problems. Whereas 20.35 percent respondents said that they don't have any strong idea about this. They said that they don't know anything in this regards.

Table 9: Greenery is Sufficient for Survival of Black Buck

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	427	354	781	42.7	35.40	39.05
No	380	432	812	38.0	43.20	40.60
Don't Know	193	214	407	19.3	21.40	20.35
Total	1000	1000	2000	1000	100.0	100.0

Source: Based on field survey

Extra Fodder during Summer Session:

The table shows about the fodder facility provided by sanctuary staff. The result shows that only 9.50 percent people are agreed that staff provide extra fodder during summer. The result is very disappointing. Because 50.10 percent respondents reported that they don't provide extra fodder during summer session. This must be checked otherwise it will affect the wild life animal health in negative way. Apart from this 40.40 percent respondents have no any idea whether they provide fodder in summer season because in the summer temperature goes up to 50^0 C. In this time it is very hard to survive without sufficient fodder.

Table 10: Extra Fodder during Summer Session

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	152	38	190	15.20	3.80	9.50
No	472	530	1002	47.20	53.0	50.10
Don't Know	376	432	808	37.60	43.20	40.40
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Sufficient Water Facility:

The given table shows the water facility provided by forest department during summer season. About 32.10 percent respondents reported that sufficient water facility provided by sanctuary staff. On the other hand 35.15 respondents reported that sufficient water facility has not been provided by sanctuary staff. About 32.75 percent respondents remarked that they don't have any idea whether sanctuary staff provides sufficient water or not. The details are given below.

Table 11: Sufficient Water Facility provided by Forest Department

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	389	253	642	38.9	25.30	32.10
No	312	391	703	31.2	39.10	35.15
Don't Know	299	356	655	29.9	35.60	32.75
Total	1000	1000	2000	100	100.0	100.0

Source: Based on field survey

Hunting Activities:

The wild life hunting is completely banned in the state. Though the following table shows that there are still some illegal hunting prevails in some areas of black buck sanctuary. Only 5.35 percent respondents reported that hunting activities are continuing in some part of the sanctuary. Whereas 52 percent respondents reported that there is no any hunting activities carried out in the sanctuary area. It is also noticeable that 42.65 percent respondents have no idea about hunting activities in the sanctuary area. The details are given in the following table.

Table 12: Hunting Activities in Sanctuary Area

Category	Response Number			Response Percent		
	Male	Female	Total	Male	Female	Total
Yes	085	022	107	08.50	02.20	05.35
No	529	511	1040	52.90	51.10	52.0
Don't Know	386	467	853	38.60	46.70	42.65
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Negative Impact on Agricultural Field:

The following table shows that there are tremendous negative impacts on agricultural fields of surrounding villages of the sanctuary. The fencing of the sanctuary area is not proper. Due to this some black bucks go outside the boundary area and enter in agricultural fields. About 71.20 percent respondents reported that there are negative impacts due to black buck entry in the agricultural fields. Only 9.30 percent respondents said that there are no any negative impacts due to black bucks. About 19.50 percent respondents didn't have any idea whether negative or positive.

Table 13: Negative Impact on Agricultural field due to Black buck

Category	Response Number			Response percent		
	Male	Female	Total	Male	Female	Total
Yes	756	668	1424	75.60	66.80	71.20
No	55	131	186	5.50	13.10	9.30
Don't Know	189	201	390	18.90	20.10	19.50
Total	1000	1000	2000	100.0	100.0	100.0

Source: Based on field survey

Conclusion:

Conservation of wildlife outside protected areas needs a holistic approach from the Government, local people and NGOs. The conservation efforts should involve local people with a sizeable flow of benefits to them coupled with active management initiatives from the forest departments including management of habitats. Timely compensation for crop damage and livestock killings should be addressed immediately. Spreading awareness about wildlife

values and their role in balancing ecosystems to the people at large is the responsibility of the forest department. Trained wildlife experts with adequate rescue and rehabilitation centers and the goodwill of people towards wildlife would certainly improve the situation in the ground level and protect the wildlife.

The aim of the research was to assess the threatened ecosystem of the Sanctuary. This study is an urgent requirement for the sanctuary as the area is limited though due to better management by the state forest department, the present census reveals that, current population of blackbucks is 2492 heads in only 797 hectare area. This situation leads towards a serious question as how to manage the population? Because in absence of large predators there is no natural control on the over increasing population of this species which threatens the whole ecosystem of the area. Due to overcrowding of this species there is severe shortage of food during summer, frequent raiding of nearby agricultural fields during food shortage and mass mortality of the species in recent years as a result of weather shocks. Both outside supply of fodder and raiding of agricultural fields create problems for both forest department as well as local people. Hence there is an urgent requirement to estimate the carrying capacity of this sanctuary through complete biomass estimation.