National Journal of Life Science, **Vol. 13(1) 2016 : 59-61** ISSN : 0972-995X (Print), 2321-7960 (Online)

IMPACT OF MINING ON FAUNAL DIVERSITY OF GUDA BISHNOIAN AREA, JODHPUR DISTRICT OF RAJASTHAN (INDIA)

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ABSTRACT : The Bio-diversity have been declining within the arid part of Rajasthan over the last few decades. The decrease in the population of wild fauna may be also due to destruction of natural habitats like illegal sand mining, stone quarries, increasing feral dog population and poaching. Guda Bishnoi area is major habitats for large number of terrestrial animals and birds in the Jodhpur district of Rajasthan. Here the Luni river bed has diversity and populations of wild fauna. These wild animals use this river banks for grazing, resting, moving and breeding. Simultaneously, these river beds are also used for sand mining purposes by people. The wide use of sand mining on the habitat of wild animals has a directly impact on their population and diversity. We studied the mining impact on bio-diversity of Guda Bishnoi area of Jodhpur district, Rajasthan during 2003-2006 and 2012-13 is discussed in this paper.

Key words : *Mining, Impact, Biodiversity, Guda Bishnoian, Jodhpur.*

INTRODUCTION

The unscientific mining of minerals poses a serious threat to the environment, resulting in the reduction of forest cover, erosion of soil in a greater scale, pollution of air, water and land and reduction in bio-diversity (UNESCO,1985). During late nineteenth century the Thar Desert, north western part of India, supported excellent mammalian faunal diversity (Blanford,1888-91 and Jerdon,1874) due to low human density. In this century the blackbuck population was very high in India (Jerdon,1874). As a result of almost continuous hunting and poaching and due to gradual degradation of its preferred natural habitats the present population of the Indian antelope may not be more than 4.6% of its earlier strength (Mukherjee, 1976). Compared with the situation even a few decades ago, the present status and population of wild animal in Thar region is drastically reduced and surviving wild fauna is fragmented and usually very small. Now wild animal can be seen in closed area, sanctuary or around Bishnoi village in the Thar region. Unscientific mining has caused degradation of land, accompanied by subsidence and consequential mine fires and disturbance of the water table leading to topographic disorder, severe ecological imbalance and damage to land use patterns in and around mining regions (Ghosh *et al.*,1988) and due to geotectonic activities and changes in the monsoon system, the water table sank and gradually the rivers vanished (Wadia, 1960).

Similarly, Environmental problems associated with mining have been felt severely because of the region's fragile ecosystems and rich biological diversity. Simultaneously in the best den grounds of the wolf and foxes are being destroyed by the sand mining activities. Since the natural predation rate is already very high it is necessary to ensure that all impacts due to human activity are minimum. Such extraction of raw materials from their natural habitats by mining, drilling, harvesting and those that relate to large scale water resources development projects, construction, agriculture, energy, industry and development projects, considerably affect the natural environment (Fedra *et al.*,2005) and one of the biggest negative impacts of quarrying on the environment is the damage to bio-diversity (Anand,2006). Illegal and excessive sand mining and stone quarry has led to the depletion of groundwater levels and environmental degradation simultaneously thrashing of bio-diversity of this region.

MATERIAL AND METHODS

The survey was conducted in two phases. Secondary sources of information were gathered from Literature, Wildlife Wing of Forest officials, villagers and shepherds on the abundance and distribution of wild fauna in the Guda Bishnoi area of Jodhpur district, Rajasthan. To estimate the population of Blackbuck and Chinkarain Guda Bishnoi area, road and line transect methods were used (Anderson *et al.*, 1979 and Sale & Berkmullar,1988). Road transects were made on two wheeler/four wheeler. Transect wise encounter rates and area wise population abundance of the wild fauna was calculated using the formula suggested by Rodgers (1991) Observations were recorded using binoculars, camera and Global Positing System (GARMINe_trex vista). Impact of Sand and stone mining activities were collected from regular field visits of the Guda Bishnoian area.

The Guda Bishnoian area situated N 26°07.426 E 73°05.495 Southeast of Jodhpur city and 629 ft altitude MSL near National highway No. 65. The area is placed at the bank of Luni river. The site had three widely separated pockets of scrub vegetation. The scrub is dominated by shrubs such as *Prosopisjuli flora*, *Capparis decidua*, *Ziziphusnum mularia*, and some other species include May ten use marginata, *Prosopis cineraria*, *Lycium barbarum* and occasionally *Acacia senegal*. Over 28 species of mammals have been recorded from this region of desert. Apart from ungulates like Indian gazelle (*Gazella bennetti*), Blackbuck (*Antelope cervicapra*) and Nilgai or Bluebull (*Boselaphaustrago camelus*) other wild animals are wolf (*Canis lupus*), Indian

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Fox (*Vulpesvulpe bengalensis*), Desert fox (*Vulpesvulpe spusilla*), Indian porcupine (*Hystirx indica*). Several unique birds are found in this region.

RESULTS AND DISCUSSION

Stone quarry and illegal sand mining from the Luni river catchment area of Guda Bishnoi in Jodhpur district, been going on for seven to eight years. Initially, the Rajasthan government gave sand mining rights to some contractors, but due to increased illegal and excessive mining, it has led to habitat degradation and decreasing the population of wild fauna in this region. The endangered species of wild fauna were found very good numbers in the area during early 80's, as reported by the State Forest Department of Rajasthan include Wolf, Caracal, Blackbuck, Chinkara, Desert fox, Desert cat, Porcupine, several unique birds and reptiles. During present study, the population density of Chinkara was obtained 5.13 indiv/sq/km and Blackbuck was found 9.6 indiv/sq/km (Table.1) simultaneously six wolves were recorded atthe bank of Luni river of Guda Bishnoian area during 2003-06 and Chinkara was recorded 5.04 indiv/sq/km and Blackbuck was found 8.91 indiv/sq/km (Table.2) while no wolf was noted during 2012-13.

The Wildlife Census figure of Forest Department of Rajasthan shows that the highest numbers of blackbuck 4237 were noted from Guda Bishnoi closed area in 2002, which reduced to 1885 in 2004 and further decreased to 1300 during 2012 and the maximum 4372 Chinkara were recorded during 2002 which decreased to 1322 in 2004 and further reduced to 1439 during 2012 (Table.3) and theWolf number were 08 in 1998 which reduced to 03 in 2007 and only 02 recorded during 2013. At once large numbers of migratory and residential birds were note dat Guda village ponds and Wolves were recorded at the bank of Luni river which is ideal den sites for this endangered animal but due to extensive illegal sand and stone mining activities destroy the natural habitats of wild fauna consequently the population of wild ungulates are decline continuously and wolves are going to disappear from the Guda Bishnoi area of Jodhpur.

According to Jerdon (1874) the Blackbuck population was very high in India during nineteenth century and the data of government census shows high population density about 8 indiv/sq/km during 1996 to 1999 in Guda Bishnoi closed area but Gehlot (2006) assessed the population density of Blackbuck and Chinkara, he reported 4.47 indiv/sq/km for Blackbuck and 5.13 indiv/sq/km for Chinkara. Mainly ungulates population decline near mining area were drilling and blasting forrock quarry near crasher and wolf population decrease at the bank of Luni river where removal, handling, transportation of soil mining are going on although some wildlife may become accustomed to blasting noises, others will move from the area.

Thus the land-use pattern undergoes a change due to the use of the land for mining, dumping, and associated activities consequently thrashing of bio-diversity of this area. Earlier, the population of Blackbuck in Jodhpur district was estimated about 6550 animals by Sharma (1980) where as Sinha

Table. 1 Population density of Wild animals (Blackbuck & Chinkara) at Guda Bishnoia area during 2003-2006.

S.	Study animal	No. of transect	Total no. of animal seen	Distance covered	Mean population density (per sq/km)
1.	Chinkara	12	253	13.32	5.13
2.	Blackbuck	12	702	19.75	9.60

Table. 2 Population density of Wild animals (Blackbuck & Chinkara) at Guda Bishnoia area during 2012-2013.

S.	Study animal	No. of transect	Total no. of animal seen	Distance covered	Mean population density (per sq/km)
1.	Chinkara	8	109	10.8	5.04
2.	Blackbuck	8	221	12.4	8.91

Table. 3 Census figures of wild animal from Forest Department of Rajasthan.

Year	Blackbuck population	Chinkara population
2002	4237	4372
2003	1475	1548
2004	1885	1322
2005	1051	1107
2006	Census was not done	Census was not done
2007	1045	1045
2008	162	835
2009	419	838
2010	537	680
2011	879	1053
2012	1300	1439
2013	1445	1440

(1981) reported 5397 blackbuck at Gudabishnoi area. Some workers have conducted studies on behaviour, ecology and distribution of wild fauna of this region (Rahmani & Sankaran,1991; Goyal *et al.*,1986,1988; Sharma,1980 and Prakash,1977). But recent studies, according to Gehlot (2006) and Hemsingh & Jakher (2007,2011) noted that the wild fauna specially Wolf, Blackbuck and Chinkara are declining due to anthropogenic pressure like illegal mining, habitat degradation, water scarcity and poaching. Hence mining operations involves deforestation, habitat destruction and biodiversity depletion in this area and the other hand protected closed areas or sanctuaries are too small to meet the entire needs of the wild life, show animal wander outside and come under increased hunting pressure (Seshadri,1969).

The observation of present status of wild fauna and threats were owing to various human activities, weak governance and extensive corruption are make possible illegal mining posing depletion of bio-diversity a t Guda Bishnoi area of Jodhpur district, Rajasthan.

ACKNOWLEDGMENT

The author is grateful to Dr. H. C. Bohra, Dr. S. P. Goyal and Prof. K. L. Shrivastava for providing the relevant literature, giving suggestions and constant help in carry out the fieldwork and preparing this manuscript.

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