

STATUS OF WILDLIFE IN WILD ASS SANCTUARY (LITTLE RANN OF KUTCH, GUJARAT STATE, INDIA)

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Introduction

An area of 4,954 km² in the Little Rann of Kutch (LRK) i.e. a saline desert in Gujarat State in India was declared as Wild Ass Sanctuary (WAS) in 1973. Kutch, Banaskantha, Mehsana, Surendranagar, Rajkot Districts as well as Gulf of Kutch in West constitute boundaries of the sanctuary. Biogeographically, the LRK falls in the 3A-Kutch Desert. The LRK, including entire WAS has been listed by the Government of India (GoI), among the first 13 wilderness areas selected for development as biosphere reserves. The proposal is pending with the GoI and the State Government for finalizing the declaration.

The LRK is characterised by dry tropical climate with brief erratic monsoon, hot summer and cold winter. It receives an average annual rainfall of 300 mm, mainly during July and August (Seshadri, 1986). The silt-laden inundation from the rivers like the Banas, the Saraswati, the Rupen, several small seasonal streams, along with high tides from the Gulf of Kutch had contributed significantly towards formation of this saline flat (Khacher, 1994). Thus, mudflats of the LRK have gradually built up year after year and the process continues through discharge of silt from rivers and tidal sediments from Surajbari creek, which now connects the LRK with the Gulf of

Kutch. The average maximum and minimum temperature is about 42°C and 12°C respectively. However, maximum temperature as high as 50°C and minimum as low as 1°C has been recorded.

Methods

Gujarat Ecological Education and Research Foundation (GEER), Gandhinagar conducted a comprehensive study in Wild Ass Sanctuary from November, 1997 to January, 1999. The LRK, fringe area, Bets of the WAS in the Greater Rann of Kutch (GRK) and Khadir Bet were covered under this study. Remote sensing study was done to know vegetation cover classes and habitat conditions. This study covers collection of extensive data on invertebrates, herpetofauna, fisheries, birds, and mammals. Bird counting was done in important wetlands during winter. Also, nesting of the Flamingo and other birds was studied in their breeding seasons. Abundance and density of the phytoplankton, invertebrate and herpetofauna were recorded by adopting proper methodology.

This was an intensive field study, involving scientists and research assistants from the Foundation and Universities. Researchers involved in the study camped in the study area to make frequent visits to different areas for collection of data in

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different seasons. For study of mammals in the sanctuary, entire area was divided into seven zones - South fringe, Eastern fringe, Northern fringe, Western fringe, creeks, Bets, part of the sanctuary in the GRK. Vehicular transect was done in the six zones, except the GRK and distance of 707 km was traversed to study the encounter rates of different mammals. Seventh zone, the WAS in the GRK was studied separately.

Foot transect was also done in the six zones to collect direct and indirect evidences of occurrence of mammals. A total distance of 636 km was travelled in 109 transects, covering 84 villages. Pellets/dung/droppings were also recorded in the all zones in prescribed width of transect to study pellet/dung/dropping density. People in the villages were inquired to collect relevant information about mammals. Wild Ass counting was done in November, 1998.

Location of dens for some carnivores and burrows for rodents were searched along the transects. Dens were identified for every species on basis of direct and indirect evidences like droppings, scats, trail marks, hair at openings etc. Local people, especially pastoralists and salt workers were consulted to confirm observations. Intensive den searching was done in relevant areas to assess breeding status and population. A team of scientists, foresters, and field assistants did intensive field study after monsoon in 1998 on all the Bets and observations were made upto border of Rajasthan and Pakistan. Khadir Bet, an important area in the GRK was surveyed by team members during Nov. - Jan., 1998. Separate registers for mammals, birds and reptiles were maintained. Field observers made regular entry in the register with all details - date, time, site, group composition, activity, habitat etc.

Habitats

The Rann gradually rises about 4 m above the High Water Line, and is seasonally flooded wetland (Merh and Malik, 1996) under 0.5 m to 1.0 m deep water during monsoon. Although major part of the Rann changes into dry mudflat after November, some of the depressions and water discharge courses provide numerous water bodies, which have immense conservation value for wildlife. The LRK produces over 2.8 million tonnes of salt annually, which is over 20% of total salt production in the county. Satellite data indicate that land under salt pans increased progressively and official figure indicates that about 46,070 ha area has been leased out till 1995 in the LRK by the authorities and they continued to grant leases even after notification of the sanctuary.

From remote sensing study (1994-97), the sanctuary is classified into three categories, i.e. (i) Rann (3,464 km²) excluding Bets, (ii) Bet (185 km²), and (iii) other than Rann area (1,304 km²). True saline desert without vegetation constituted about 72% of the sanctuary in 1995. Remote sensing based study identified 74 elevated plateaus or islands (locally called Bet), including 23 dhoris or dhasis, which are small uplands formed mostly due to accumulation of mud and sands over time.

Size of Bets varies from 4.7 ha area of the smallest Bet (Panchham) to 3,050 ha of the largest Bet (Pung). Six Bets have area over 1,000 ha. Nanda is the only Bet, which has human habitation and cultivation. About 33% of Bet area is under *Prosopis* whereas herbaceous vegetation constitutes 23% of the net area. Barren area on the Bets is being progressively converting into herbaceous and *Prosopis* cover. Analysis of

the data indicates that the area under *Prosopis chilensis* has been increased from 334 km² (1983) to 428 km² (1995) in the sanctuary at rate of 950 ha/year. The growth of *Prosopis* has been observed on 28 bets in 1982-84, 31 Bets in 1986-87, 40 Bets in 1992 and 42 in 1995 (Singh *et al.*, 1998). This species provides dense cover on some of the Bets and fringe area, making it difficult for ungulates to enter the forest.

On the basis of dominance of species, vegetation types in the Wild Ass Sanctuary are classified into - (i) *Prosopis* forest, (ii) *Salvadora-Capparis* type, (iii) *Salvadora* scrub, (iv) *Suaeda fruticosa* type, (v) *Suaeda nudiflora* type, (vi) Saline-alkaline scrub, (vii) grassland, including saline grassland, (viii) saline herbaceous cover (Singh *et al.*, 1998). Original vegetation compositions have been modified and transformed due to various changes including the invasion of *Prosopis juliflora*. Saline herbaceous cover is second major vegetation type after *Prosopis juliflora*. Ecotone between mudflat and *Prosopis* forest and scrubland is occupied by herbaceous vegetation. At places *Cressa cretica*, *Aeluropus lagopoides*, *Suaeda fruticosa*, *Cyperus rotundus* and *Fragaria cretica* from pure patches. Plant diversity is poor as only few species are found at a site with dominance of one or two species and composition of plants depend on elevation of land from the level of the vast Rann. This study recorded 251 species of flowering plants belonging to 183 genera and 59 families, and 107 species of phytoplankton.

Invertebrates

93 species of invertebrates, including 25 species of zooplankton and 27 species of spiders were collected during the study. Checklist of invertebrates, their abundance

and distribution could be recorded but due to lack of expertise other animals in this group could not be studied thoroughly.

Herpetofauna

33 species of herpetofauna (4 amphibians and 29 reptiles) were recorded during the study. Amphibian diversity is poor as three species of frogs (*Hiplobatrachus tigerinus*, *Euphlyctis cyanophlytis*, *Limnonectes limnocharis*) and a toad (*Bufo stomaticus*) could be spotted in the sanctuary. Unlike amphibians in the sanctuary diversity of reptiles is high as 29 species were found to inhabit in the LRK, which included 2 chelononians, 14 lizards, 12 snakes and one species of crocodile.

Indian Flapshell Turtle (*Lissemys punctata punctata*) is most common as 293 turtles were encountered during study. Indian Starred Tortoise (*Geochelone elegans*) is rare as its sightings are not frequent. Spiny-tailed Lizard (*Uromastix hardwickii*) is common and its burrows were seen on Bets and fringe area. Its density varied from 0.0179 m² (on Jesra) to 0.0001/m² (at Thar and Nanda Talao). This species is heavily poached in and around the sanctuary. It is observed that high density of *Prosopis chilensis* do not hold any *Uromastix*. Out of 12 species of snakes, Saw-scale Viper (*Echis carinatus*) and Common Cobra (*Naja naja naja*) are most common.

Birds

The LRK provides an unique abode for large number of diverse fauna in the region. Total 179 species of birds (82 terrestrial birds and 92 water birds) were spotted in the sanctuary. 70.45 of total terrestrial

birds are resident whereas this figure is only percentage for waterbirds. About 80,200 water birds were counted at five water bodies (19,530 at Shedwa 6850 at Bajana, 1,830 Surajabari and 37,880 at Northern and Southern water bodies of Nanda, 13,100 at Navatalav) during peak wintering season. During monsoon, entire Rann supports large number of resident birds. White Pelican, Dalmatian Pelican, Painted Stork, Spoonbill, Greater Flamingo, Lesser Flamingo, Shoveller, Pintail, Wigeon, Common Teal, Coot, Common Crane, Demosselle Crane, Avocet, Blackwinged Stilt, Black-tailed Godwit, Ruff, Plovers, Slender-billed Gull, Brown-headed Gull, Gull billed Tern, Whiskered Tern are main water birds in the LRK.

41 Houbara Bustards were seen opportunistically during the season. 9 Houbara Bustards were encounter on Bhangara Bet near Khadir (GRK) in January, 1999. Cream coloured Courser, Bifasciated Lark, Short-tailed Lark, Crested Lark, Desert Wheater, Sandgrouses, Rosy Paster are main terrestrial birds on Bets and in fringe area. Species found ground nesting in the Wild Ass Sanctuary were Lesser Florican, Indian Sandgrouse, Red-wattle Lapwing, Blackwinged Stilt, Grey Partridge and Ashy crowned Finch Lark. A large nesting colony of Lesser Flamingo was recorded in August, 1998 in the LRK at 9.0 km in the West of Jilandhar and at 7.5 km in South of Wasraj Solanki Bet. The colony was spread over 250 acre and 30,000 adult birds and 25,000 chicks were estimated during the breeding season. Another estimate in the peak breeding season made an estimation of 70,000-75,000 Lesser Flamingos at the site. Although attempt by the birds nesting in small scale was recorded in the past, this is first such record of large nesting colony in

the LRK in the recent past. Caspian Tern is another important ground nester in the WAS. The colonies of tree nesting birds like Gray Heron, Cattle Egret, Large Egret, Little Egret, Indian Reef Heron, Night Heron, Painted Stork, White Ibis and Spoonbill were recorded in the fringe area.

Mammals

Mammals in the Indian Desert are represented by 9 orders, 47 genera and 68 species (Alfred and Agrawal, 1996). Out of the 68 species, 64 species of mammals are recorded in Gujarat portion of the Indian Desert and majority of them occur in the LRK. This study recorded 33 species of mammals, which do not include entire list of rodents and bats. Nine species of mammals in the LRK are listed in the Schedule I of the Wildlife (Protection) Act, 1972, which are at various stages of endangerment in the country. Due to single population of the Indian Wild Ass, the species is qualified to be listed in the IUCN Red List. *Equus hemionus khur* and *Mus platythrix*, the two mammalian species of the region are Indian Endemics.

The Indian Wild Ass (*Equus hemionus khur*) had fairly wide distribution in the dry regions of North-West India and West of Pakistan in the last century. The Wild Ass of Sind (*E. h. khur*) was hunted by Akbar (1571), great Mughal Emperor on the banks of Sutlej river. Jahangir has recorded its flesh to be halal and good eating (Rao, 1957). Today, the Wild Ass is restricted to the LRK and its peripheral areas. In 1960, Dr. Salim Ali put an estimate of about 2,000 khurs in the LRK. During 1958 to 1961, some Wild Asses died due to an outbreak of South African Horse Sickness and an arthropod borne disease known as Surra, and a population of 870

was estimated in 1962 (Gee, 1963). An aerial survey in 1969 could record a population figure of 362 Wild Ass (Forest Department). Since then the Gujarat Forest Department conducted three censuses in 1976, 1983 and 1990. Population increased consistently from 720 in April, 1976 to 1989 in April 1983 and 2,072 in March, 1990. Population was estimated to be 2,990 in November, 1998 by the GEER Foundation.

In 1976, the Wild Ass was restricted within the 5 km from the sanctuary fringe. Animals migrated to the areas beyond 10 km from the Southern Rann fringe in 1989 (Shah, 1993). During recent survey, 27 Wild Ass were seen on Bhangara and Kakidiya Bets near Khadir. As per a study in November, 1998 population of about 60 Wild Ass was estimated in and around the Khadir Bet. Local people confirmed that Wild Ass was not seen in this area before 15 years and their number is now increasing consistently. During same period (November-December, 1998), total 53 Wild Ass were encountered in the part of sanctuary in the GRK (26 in Fategadhi and 27 in Nada and other Bets near Rajasthan). Three Wild Asses (two adult and one foal) were seen at border in Rajasthan area. Foot marks from Bela to Tuta to Pakistan border indicate that animals regularly visit Pakistan border, which was confirmed by the personnel of Border Security Force. Some Wild Asses had migrated out of the sanctuary to Nalsarovar Bird Sanctuary and Bhal area. Sightings were also made near Dhandhuka-Dholera highway. A herd of 18 Wild Ass was counted near Kalatalav in monsoon of 1998 and another group of 6 Wild Asses were seen near Devalthan during same period.

358 Wild Asses congregated on Pung Bet during monsoon in October, 1997 as

breeding herds from fringe areas moved to the Bet during the breeding season. This number was recorded to be 415 in October, 1998. The largest herds of 89 Wild Asses was at Visnagar, 86 at Koparni, 70 between Kanach and Thala Rann, 68 at Kidi, 61 at Degam Rann. 60.4% of total Wild Asses were recorded in group size of small (3-20) to medium (21-40) and 36.3% in very large group-size (41-90). After analysis of data, it was observed that Rann without vegetation was most preferred habitat for Wild Ass as over 40.0% of total sighted animals were recorded in the Rann. This was 29.3% when entire population in the fringe areas outside the sanctuary is accounted with the population of the LRK. This proves beyond doubt that, although large area of barren Rann does not provide any food, Wild Ass spends maximum time in such areas for different activities. Grass-*Suaeda* cover, grass-*Suaeda* with sparse *Prosopis* cover are other preferred habitat for the animals.

Counting of Wild Ass was done in and around the LRK in November, 1998 and total 2,446 animals were counted. 53 Wild Asses were counted in the sanctuary in the GRK. On the basis of the observations and indirect evidences, about 490 Wild Asses were estimated in the areas beyond 10 km from the boundary of the sanctuary. Thus, this study estimated a population of 2,990 Wild Asses in Gujarat.

Fortunately, the region did not face any serious drought after 1987 and reproduction had been satisfactory during recent past. About 490 Wild Asses dispersed in new areas far away from the boundary of the sanctuary. Out of 2,446 Wild Asses in and around the LRK, 407 were foals (267 young foals - less than one to two months old) and male : female ratio was 13:28. Population distribution in different habitats

was - 23.9% in the Rann, 17.2% in Bets, 42.5% in fringe areas and 16.4% in areas beyond 10 km from the boundary of the sanctuary. This seems that dispersed population is on increase in new areas. Census figure revealed that 76% of total population were found in Dhrangadhra/Halvad zone (Western and Southern fringe along with Rann, Bets and other areas near these fringes).

The most potential area of Chinkara (*Gazella bennetti* Sykes, 1831) in the LRK are the Bets-Pung, Dhut, Mardak, Nanda, Shedwa, Wasraj, Khijadiya Dana Bir etc. The LRK supported good number of Chinkara in the past. Number consistently declined due to loss of habitat and poaching. Census conducted by the Forest Department in 1976, 1983 and 1990 counted Chinkara population in and around the sanctuary was 191, 906 and 967 respectively. The pellet densities of 2.9 pellets/ha in the Western creek, 1.9 pellets/ha in Western fringe and 0.6 pellets/ha in Northern fringe were recorded. Total 104 Chinkara were encountered in the area. It is difficult to make accurate estimate, but analysis of data indicates that the population is below 150 (about 110-150) in the sanctuary. Chinkara population declined in the LRK due to poaching and loss of habitat as a result of invasion of *Prosopis* and grazing. Predation by the wolf may have also contributed to the decline in number.

The LRK is not important habitat for Blackbuck (*Antelope cervicapra*) but the Antelope occurred in good number in the past in fringe areas, which had grassland and agricultural fields. Forest Department counted a total of 625 individuals in 1989 and 550 in 1994 in adjoining area in District Surendranagar. Nine Blackbuck were

counted during the census held in the sanctuary in 1976, 3 in 1983 and 23 in 1990. A total of 19 Blackbuck were sighted during the study in fringe area. One was reported from the GRK near Kakaria Bet and 18 were sighted in crop-fields between Mandal and Karyana near Jhinzuwada.

Like in other parts of the State, number of Bluebull or Nilgai (*Boselaphus tragocamelus* Pallas, 1766) has also increased in the sanctuary. Result of Bluebull census conducted in 1995 in the State provided a population of 163 animals within the sanctuary. Total 309 Bluebull were counted opportunistically during the study. The Eastern fringe had the highest dung density of 11.3 dung/ha, Southern creek 4.8 dung/ha, Southern fringe 4.5 dung/ha, Northern fringe 2.3 dung/ha, Western creek 2.4 dung/ha, Western fringe 4.6 dung/ha, and the Bet 0.9 dung/ha (Shah, 1998). Sightings of Bluebull, encounter rate and dung density revealed that fringe areas of the sanctuary provide habitable area to Bluebull. In absence of its predation and poaching, the Bluebull population is likely to grow progressively and may pose serious wildlife-people conflict. Also the Wild Ass and Chinkara may compete for resources with Bluebull.

A decade ago Wild Boar (*Sus scrofa*, Linn., 1758) menace was restricted in Northern fringe only (Shah, 1993). At present, both the Wild Boar and feral Pigs have increased in all fringe areas and cause considerable damage to agricultural crop. Only 87 Wild Boar were counted in the sanctuary in 1983, but now number appears to be much higher. A total 113 Wild Boar were sighted opportunistically during one year of the study. Study on dropping density reveals that this species is now distributed in all parts of the sanctuary. Dropping

densities of 2.45 droppings/ha in Western creek, 1.32 droppings/ha in Northern fringe, 1.17 dropping/ha in Eastern fringe, 0.89 droppings/ha in Southern fringe, 0.61 droppings/ha in Western fringe and 0.56 droppings/ha on Bets have been estimated in this study.

Wolf (*Canis lupus palipus* Sykes, 1831) is the largest carnivore in the LRK. Chinkara, Blackbuck and minor mammals were prey for the Wolf but scenario has changed due to depletion of Antelopes population and loss of habitat. In changed situation, Wolf has shifted predation preference from wild animal to sheep and goats. Although habitat degradation caused decline in the Wolf number but thickets of *Prosopis* provide shelter for denning and breeding of the Wolf. During the study in 1997-98 only nine Wolves were sighted opportunistically in the sanctuary, but pastoralists and salt workers provided information about frequent sighting of Wolf. A total 57 Wolf dens (34 active, 23 inactive) were searched in fringe area (Shah, 1998), Forest Department estimated Wolf population of 61 in 1976 and 65 in 1983. Study in and around the LRK and the sanctuary part in the GRK projects a range of 80-90 Wolves in and around the sanctuary. Maximum population is concentrated in Southern fringe, Western fringe and the sanctuary in the GRK. During study, it was revealed by local people and pastoralist that a large number of Wolf pups were killed by pastoralist during the period.

Jackal (*Canis aureus* Linn, 1758) is common throughout the LRK but sighting rate has declined as per information from local people. Jackals are killed by Vaghri community. 59 Jackals were opportunistically sighted during the study.

Scat study indicates that Southern fringe had a high scat density of 1.8 scats/ha. Other areas like Western creek had 1.4 scats/ha, Eastern fringe 1.8 scat/ha and Northern fringe 1.1 scats/ha. Scat density was very poor on Bets as no scats were seen on the transect.

During this study, a total of 35 Common Fox (*Vulpes bengalensis* Shaw, 1800) were sighted opportunistically. A total of 188 Fox dens (145 active and 43 inactive) were counted in the sanctuary during first phase. This involved 66 hrs of search, covering 260 km in 40 villages in 29 days. Also, good number of dens were seen in other areas of the sanctuary during last phase of the study. Scat study revealed that Western fringe had highest scat density of 0.52 scat/ha, Northern fringe had 0.44 scats/ha whereas Southern fringe had 0.15 scats/ha. Eastern fringe, creek area and Bets had shown no occurrence or very poor occurrence of scats along the transects. Direct sightings, observation on denning sites and density of scats indicate that the sanctuary still support good number of Common Fox.

Direct and indirect evidences of Hyena (*Hyaena hyaena* Linn 1758) in Western, Northern and Eastern fringes, Jilandhar, Pung, Dhut, Mardak and Wasraj Bets indicate that this species occur in these area. Seven denning sites of Hyena were seen during this study. Three zone had occurrence of scats, with Western fringe 0.09 scats/ha. Although only one Hyena was seen on the Khadir Bet but people confirmed occurrence of many Hyenas on the Bet. Population of Hyena was not estimated in the WAS, but they occur in majority of the area with low population.

In addition to above mammals, direct and indirect evidence of occurrences of

Desert Fox (*Vulpes vulpes pusilla*), Caracal (*Felis caracal*), Jungle Cat (*Felis chaus*), Desert Cat (*Felis libyca*), Small Indian Civet (*Viverricula indica*), Ratel (*Mellivora capensis*), Small Indian Otter (*Lutra perspicillata*), Mongoose (*Herpestes* sp), Pangolin (*Manis crossicaudata*), Hedgehog (*Paraechinus micropus*), Longeared Hedgehog (*Hemiechinus collaris*), Musk Shrew (*Suncus murimus*), Indian Hare (*Lepus nigricollis*), Porcupine (*Hystrix indica*), Five striped Palm Squirrel (*Funambulus pumati*), Gerbills and rats (*Merione hurrianae*, *musbooduga*) and bats (microchiroptera and megachiroptera) were collected.

Only two Desert Foxes, including one sighting in the GRK, were seen. Caracal was not seen but people confirmed its occurrence. Local people also confirmed occurrence of Caracal on Khadir Bet. 18 Jungle cats were sighted opportunistically in the sanctuary. Only two confirmed sightings of Desert Cat were made during the study, although more sightings were claimed by investigators but not authenticated. Small Indian Civet, Ratel,

Smooth Indian Otter and Pangolin were not seen directly but indirect evidence about their occurrence were recorded. Two species, Common Mongoose (*Herpestes edwardsi*) and Small Indian Mongoose (*Herpestes autopunctatus*) are distributed in the WAS. Pale Hedgehog and Longeared Hedgehog occur in good number in fringe area. Musk Shrew was the most commonly reported insectivore in all the fringe villages.

Total 102 Indian Hares were sighted opportunistically in the sanctuary. Study on dung density indicated that Hare are distributed throughout the sanctuary. Porcupine occurs in good number in the fringe areas. 42 burrows of Porcupine were searched, involving 66 hours of search effort (Shah, 1998). Majority of burrows were located in Southern fringe. Five striped Palm Squirrel, Gerbills and Rats were not studied but they are very common. It is expected that several species of this group of animal occur in the sanctuary. Similarly, bats are not studied, but many species of bats (fruitivores and insectivores) occur in this region.

SUMMARY

Little Rann of Kutch is unique ecosystem in the world, which supports rare, endangered and endemic flora and fauna of the country. High conservation value has been accorded to the LRK by selecting area for one of the proposed biosphere reserve of the country. Expansion of salt work, firing practice by Indian Army, non-settlement of the sanctuary, grazing, invasion of *Prosopis*, crop raid by the wildlife, change in land-use pattern in and around the sanctuary and poaching are important threat factors responsible for degradation of the habitat and decline of the population of some of the wildlife. To conserve flora and fauna of the area effectively, it has become necessary to settle all legal issues so that the sanctuary is managed as per the Wildlife (Protection) Act, 1972. Although population of the Wild Ass has increased and animal has dispersed in new area of original habitat. Movement of the Wild Ass in new area due to loss of habitat caused man-animal conflict. In background of this fact, it is necessary to improve the habitat by removing factor of degradation of the habitat and bringing back the original vegetation by eradication of *Prosopis* from some of the areas.

जंगली गद्दा अभयारण्य में वन्यप्राणियों की स्थिति

एच.एस. सिंह व वी.सी. सोनी

सारांश

कच्छ का छोटा रण्य संसार की एक विलक्षण परिस्थिति-संहति है जहाँ खतरे में आए देश के और यहीं पर सीमित पेड़-पौधे और पशु पक्षी पाए जाते हैं। इस क्षेत्र को प्रस्तावित जीवमण्डल बनाने के लिए चुनकर कच्छ के छोटे रण्य का अत्यधिक संरक्षण महत्व प्रदर्शित कर दिया गया है। इस प्राकृतावास का विनाश और यहाँ के वन्य प्राणियों में कमी आने के लिए कई संकटकारी कारक जिम्मेदार हैं। यद्यपि जंगली गद्दों की संख्या बढ़ी है परन्तु यह मूल क्षेत्रों को छोड़कर नए क्षेत्रों में फैल गया है। अपने मूल प्राकृतावास में मानव-पशु संघर्ष होने के कारण उसके निकल जाने से यह आवश्यक है कि इस प्राकृतावास को व्याप्त करने वाले कारकों को दूर करके उसमें सुधार किया जाए और पहले वाली वनस्पति उसमें फिर से वापस लाई जाए।

References

- Alfred, J.R.B. and V.C. Agrawal (1996). *The mammal diversity in the Indian desert. Gaps in research* (Eds. Ghosh, A.K., Bangri Q.H. and Prakash I.). Scientific Publishers, Jodhpur.
- Gee, E.P. (1963). The Indian Wild Ass : A survey. *J. Bom. nat. Hist. Soc.*, Mumbai.
- Khacher, Lav Kumar (1994). Study on biosphere reserve in the Gulf of Kutch.
- Merh, S.S. and J.N. Malik (1996). Terrain characteristics of Kachchh, Western India.
- Rao, H. Srinivas (1957). History of our knowledge of the Indian fauna through ages.
- Singh, H.S., Rishad Pravej, V.C. Soni, Neeta Shah, V. and Bharat H. Patel (1998). *Ecological Study of the Wild Ass Sanctuary*. Gujarat Ecology Education and Research Foundation, Gandhinagar. (in press).
- Shah, Neeta, V. (1993). The ecology of Wild Ass in Little Rann of Kutch. *Ph.D. Thesis* M.S. university, Vadodara, Gujarat.
- Shah, Neeta, V. (1998). *Study on mammals under the ecological study of the Wild Ass sanctuary*. GEER, Foundation, Gandhinagar. (in press).
- Seshadri, B.A. (1986). *India's wildlife and wildlife resources*. Sterling Publication Pvt. Ltd. New Delhi.
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