

Study on the distribution and occurrence of some threatened avifauna of Sajjangarh Wildlife Sanctuary, Udaipur, Rajasthan

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Abstract

Sajjangarh Wildlife Sanctuary is the smallest sanctuary of Rajasthan state, India. One hundred and twenty nine bird species were identified in and around this sanctuary during study period and 8 species (*Sarcogyps calvus*, *Gyps indicus*, *Gyps bengalensis*, *Neophron percnopterus*, *Parus nuchalis*, *Threskiornis melanocephalus*, *Mycteria leucocephala* and *Phoenicopertus minor*) were identified in threatened category according to IUCN 2008. Their habitat preference and vegetation of their habitat were also analyzed in accordance to the number of times a bird was observed in a particular area.

Introduction

The number of species in biotic communities generally increases from high to low latitudes and from high to low elevations (Kerr, 1999). Arctic tundra supports fewer species than does a deciduous forest, an alpine meadow less than a succulent desert. Yet, under the same macroclimatic conditions, community diversities can vary markedly at any latitude. Oriens (1969), Karr (1971), Recher (1971), Nazneen *et al.* (2001) and Gupta (2004) discussed and summarized factors that may affect general and/ or local pattern of species diversity.

Birds have always fascinated man for their ability to fly in air and for their exquisite colouration. They have their functional role in the ecosystem as potential pollinators and scavengers and may be rightly called bio-indicators. The distribution and occurrence of avifauna correlate well with the vegetation patterns of the area, which is of great significance. India, being one of the mega diversity countries, harbours around 1,200 species of birds which amounts to 13 percent (9,600 species) of the bird species of the world (Ali and Ripley, 1987).

Habitat degradation is today a major threat for the extermination of avian species. Due to the diminishing of natural habitat by varied anthropological activities animals are facing a high risk of extinction. So it is the primary requirement of any conservation program to analyze the habitat of the area, and the habitat preference of the species within the area, so that further management policies can be laid upon. The southern part of Rajasthan is lush green, which supports great avian diversity and the present study area falls into this zone of the state. Despite of many intensive studies on avian diversity and ecology in the state, the Sajjangarh Wildlife Sanctuary is lacking a baseline study. Very few studies on ecology and biodiversity have been carried out in the study area. Present investigation was carried out with the view to record the habitat preferences of some threatened birds present in the sanctuary.

Study Area

Sajjangarh Wildlife Sanctuary is the smallest amongst the 25 wildlife sanctuaries of Rajasthan, the largest state in the country in terms of area. It is located at a distance of only 5 km from Udaipur city and spreads over an area of 5.19 km² including only one forest block Sajjangarh (Figure 1). Geographically, it is situated between 73° 39' – 73° 40' East longitudes and 24° 35' – 24° 39' North latitudes. Altitude varies from 630 - 936m above MSL. The periphery of the sanctuary is constituted by Udaipur City and three villages namely Hawala, Bari, and Gorella which lie adjacent to its boundaries. Five other villages namely Sisarma, Kodyat,

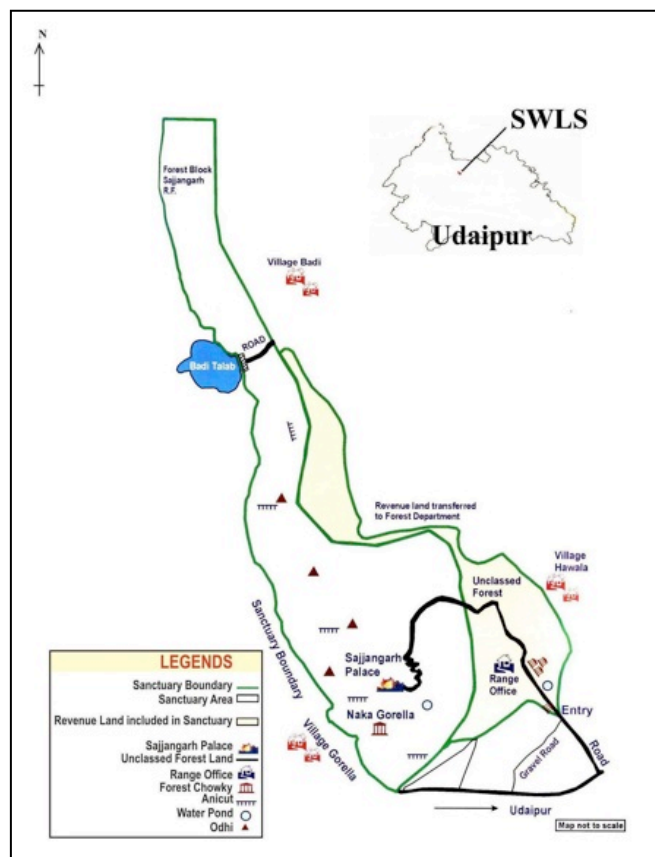


Figure 1. An outline map of Sajjangarh Wildlife Sanctuary (not to scale).

Barda, Morvania and Rampura (Ratakhet) are in 5 km range and fall into the zone of influence of the sanctuary.

The sanctuary lies in one of the oldest geological formation of the world – the Aravallis and is located atop the Bansdara Hill in the most fragile ecosystem of Aravallis. Unfortunately, the over exploitation and non-judicious harnessing of biological and non-biological resources of the Aravallis in the name of rapid development much beyond the sustainable limits, has left the Bansdara Hills in a much precarious condition. Summers are generally hot with an average temperature reaching up to 42°C; while in winters it ranges to a minimum of around 06 °C. Humidity is generally low. Rainfall in the area is erratic and unevenly distributed. It receives an average of approximately 650 mm rainfall annually.

Sanctuary has a total of seven water holes. Out of these some are made of natural or man made dug out areas in soil, while others are man made and cemented.

Methodology

Study was carried out from January, 2002 to January, 2008. Rapid and extensive preliminary field surveys were carried out in sanctuary and its surroundings, during the first week of the study period. All forest trails, tracks and water holes were searched to gather information regarding the presence

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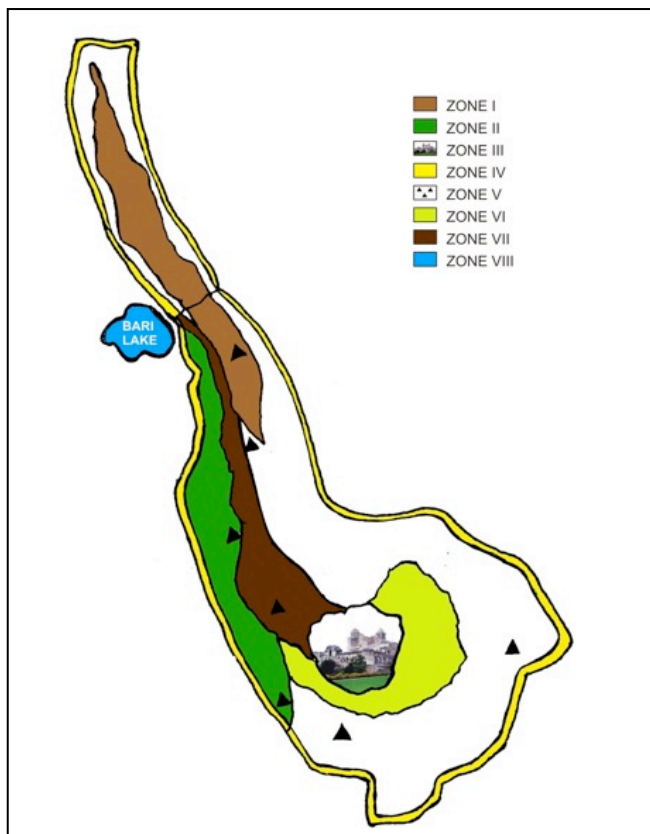


Figure 2. Habitat zones of Sajjangarh Wildlife Sanctuary

of the avian species, and the habitat structure of the area. The encounter rates (number of species seen/visit) of birds were recorded. On the basis of information gathered from the preliminary survey of area and land cover, the study area was divided into 8 zones to accomplish further study. The three types of forests (dense forest, open forest and scrub forest) were differentiated by observing the canopy cover. Here, the density refers to the spacing of trees.

The zones of the sanctuary area were divided into following categories (Table – 1 and Figure 2): To analyze avian diversity (species richness) of Sajjangarh Wildlife Sanctuary, the Timed Species Count Method (Pomeroy and Tengeth, 1986) was used and the habitat preference of birds was analyzed by three methods in the present study. First was altitude wise categorization of birds. The basis of altitude wise zonation was different types of vegetation, which are found at different altitudes. The first zone was recorded at a height of 634 MSL to 734 MSL. The second zone was 734 MSL-834 MSL and the third zone ranged from 834 MSL to 936 MSL. Second method was guild-wise categorization of bird's species and third method was of sighting frequency (birds/visit) in different habitats (Gaston, 1973). Birds were identified by consulting the literature such as Grimmett and Inskipp (1999), Ali and Ripley (1983) and Grewal (1993). Some information was also collected from the local people.

Result

A total number of 129 bird species, including both terrestrial and aquatic category, were encountered and identified during the present study. Thirty three families, sixty two genera and ninety one species were recorded in terrestrial category. According to frequency wise grouping 23 species were more common (MC), 22 common (C), 25 less common (LC), 12 uncommon (UC), 2 rare (R) while 7 species were very rare (VR). According to local status eight are winter migratory, two are passage migrants and eighty one are resident.

Sanctuary is supported by a peripheral lake ecosystem named Lake Bari which lies in close proximity on the western boundary. The sanctuary and its surrounding rocks are the roosting site for various bird species. In aquatic bird category, 14 families comprising 32 genera and 38 species were identified. In this category 14 species were winter migratory (WM) and 24 were resident (R).

Sajjangarh Wildlife Sanctuary is although the smallest sanctuary of Rajasthan state, but it harbours a significant number of threatened birds, which belong to different categories according to IUCN 2008. Four species of vultures were identified out of which *Sarcogyps calvus*, *Gyps indicus* and *Gyps bengalensis* are categorized in critically endangered while *Neophron percnopterus* falls under endangered category. Among other terrestrial birds one species *Parus nuchalis*, which is quite common in this sanctuary has been categorized as Vulnerable. Among aquatic bird species *Mycteria leucocephala*, *Threskiornis melanocephalus* and *Phoenicopterus minor* are categorized in Near Threatened group (Table – 2).

Sighting records of vultures has been mention in Table 2. *Sarcogyps calvus* (King vulture) were sighted twice in the sanctuary during the course of study on Maharana Pratap Nature Trail and its surrounding, which has rocky and sparse vegetation type of habitat. The trail provides proper height to take a clear flight and soaring and is also in vicinity of Gorella village. This habitat is very congenial for King vulture because it makes its nest in big trees and always prefers the top branches (Subramanya and Naveein, 2006). The habitat is also beneficial from the feeding point of view as this place gives a good view of neighbouring areas including the Bari Lake. *Gyps indicus* has been sighted in the sanctuary in the area surrounding the Bari Lake (Table 2). This area has tree, shrubs and mountain climbers. The nest of this vulture is made of sticks and twigs at a height of 7 to 14 meters in above mentioned trees. During the course

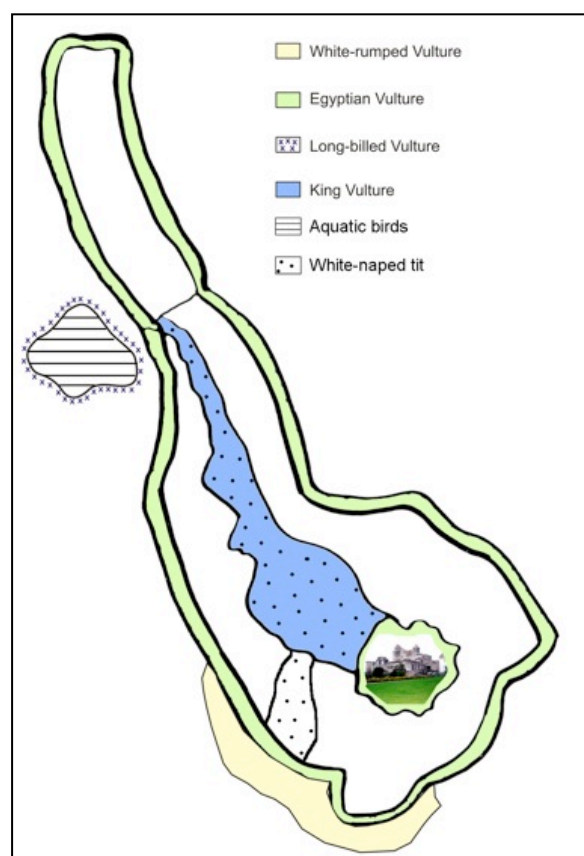


Figure 3. Habitat preference of threatened birds of Sajjangarh

of present study, it has been reported in the surroundings of Lake Bari but the number of individuals was only two but 13 individuals were recorded on 24.5.2002. *Gyps bengalensis* has been evidenced on the first turn towards Gorella point. This is a forest road and the vultures are generally seen resting on bare rocks. It has also been sighted from the surroundings of the sanctuary. The vulture is present in this area due to the availability of carcasses of animals like buffaloes, cows and goats thrown here. *Neophron percnopterus* was sighted on the periphery of the sanctuary and has also been observed flying over the palace building because it always prefers a high altitudinal area. Beside *Sarcogyps calvus*, all three species of vulture prefer zone-I (634MSL to 734MSL) and *Sarcogyps calvus* akin to zone-II (734MSL-834MSL) of sanctuary habitat according to the altitude-wise zonation (Table 3). They are scavengers and carrion feeders. Their main food in and around sanctuary are carcasses from surrounding villages, carrion offal, garbage, human ordure and sometimes at tiger and panther kill at forest. Usually their feeding on carcasses, were observed outskirts of the sanctuary.

The forest type in the sanctuary is open dry deciduous kind that is a suitable habitat for *Parus nuchalis*, a bird of vulnerable category, which is endemic to the sanctuary. The high occurrence zones of this species are Zones II and VII and also along Maharana Pratap Nature trail. Some observations were also taken towards Gorella. The three aquatic birds fall under near threatened category and were observed in Zone VIII.

Discussion

Sajjangarh Wildlife Sanctuary, an IBA site of Udaipur, has a diverse and vivid avian fauna. It also harbours nine threatened avian species. *Gyps bengalensis* prefers southern part of sanctuary, which is rocky, has less vegetation and is near to human establishments. *Neophron percnopterus* uses Zone IV near the periphery of sanctuary. Donazar *et al.* (1993) showed that breeding density of vultures was directly related to the ruggedness of the topography, altitude and distance to the nearest village. Breeding density is also related with these factors. Open area seemed also to have positive effects, probably by increasing the availability of food, although its effects were not separable from that of the relief, as the two factors covary. Vultures showed lower breeding success by reducing accessibility to human, and perhaps by increasing food availability (Donazar *et al.*, 1993). Most importantly and urgently, now that the main cause of the vulture population decline has been discovered to be diclofenac (Oaks *et al.* 2004), the use of this drug needs to be banned, and stocks replaced with a safe alternative. Land-use patterns influence raptor diversity and density (Herremans and Herremans-Tonnoeyr 2000). In Africa, Brandl *et al.* (1985) reported a negative correlation between human impact on the landscape and raptor diversity and density. However, vultures have the highest density at the interface between protected and unprotected areas (Herremans and Herremans-Tonnoeyr 2000). In the present study also, the vultures were seen more on the periphery of the sanctuary near the human habitations such as village Hawala and Gorella.

In India, nesting and roosting habitats for *Gyps* vulture are abundant and vultures mainly use kapok trees for nesting in the Rampur valley (Prakash, 2001). According to Prakash *et al.* (2007), although thousands of vultures may remain, they are now spread very thinly across a huge area. This is a dangerous situation for such social birds, which nest and roost communally and rely on information gained from one another when searching for widely dispersed food sources. In 2002, 13 individuals of *Gyps indicus* were sighted around Lake Badi by Sharma (2007). The number of individuals has

decreased in five years. Thus, although the habitat is congenial for King vulture but due to increasing human population and diminishing forested areas breeding potential of this vultures seems to be on decline.

Parus nuchalis is present in wide area of sanctuary. It covers the whole Zone VII which has open low land scrub with sparse vegetation at foothills. This bird is endemic to the sanctuary and can be seen in frequently. Gajera *et al.* (2009) opined that this species is threatened and is a resident breeder in Danta Forest Range, northern Gujarat. As the distance between the breeding ground of this bird and the sanctuary is not much and the habitat type is similar, this bird is a resident of Sajjangarh also.

Out of the three aquatic birds, two are resident (Black-headed ibis and Painted stork) while the Lesser flamingo is winter migrant. These birds find a congenial habitat and are therefore present in the study area. The major threats faced by these birds were analyzed to be habitat loss, water pollution due to anthropogenic activities such as washing, bathing, power boat plowing and disturbances through tourism.

Tourist activity has increased year after year in the city and the sanctuary is one of the major tourist attraction site. Due to increased anthropogenic activities, the fauna of the sanctuary faces stress because of intrusion, vehicular exhaust, lights, littering and noise. Flood lights meant to attract tourists at Monsoon Palace are also encroaching upon the privacy of birds and other fauna.

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Table 1: Habitat and flora of various zones of Sajjangarh Wildlife Sanctuary

Zone	Habitat	Flora
I	Rocky habitat with sparse vegetation	<i>Acacia leucophloea</i> , <i>Anogeissus pendula</i> , <i>Rhus mysurensis</i> , <i>Ziziphus nummularia</i> , <i>Lantana camara</i> , <i>Apluda mutica</i> , <i>Heteropogon contortus</i> , <i>Acacia senegal</i>
II	Thickets with rich vegetation cover	<i>Apluda mutica</i> , <i>Heteropogon contortus</i> , <i>Bothriochola pertusa</i> , <i>Acacia senegal</i> , <i>Ziziphus nummularia</i> , <i>Cassia auriculata</i>
III	Steep hillsides with rich vegetation cover	<i>Boswellia serrata</i> , <i>Lannea grandis</i> , <i>Sterculia urens</i> , <i>Ficus arnottiana</i> , <i>Dendrophoe fulcata</i> , <i>Lantana camara</i> , <i>Euphorbia nerifolia</i> , <i>Wrightia tinctoria</i> , <i>Dendrocalamus strictus</i> , <i>Dicleptera verticilata</i> , <i>Peuraria tuberosa</i>
IV	Peripheral area outside the wall of sanctuary	<i>Acacia nilotica</i> , <i>Dendrocalamus strictus</i> , <i>Madhuca indica</i> , <i>Acacia senegal</i> , <i>Butea monosperma</i> , <i>Cassia tora</i> , <i>Lantana camara</i> , <i>Acacia catechu</i> , <i>Lannea grandis</i> , <i>Boswellia serrata</i> , <i>Diospyros montana</i> .
V	Other infrastructures and cliffs and ruins within the limits of study area	<i>Lindenbergia muraria</i> , <i>Lannea grandis</i> , <i>Actinopterus raditum</i> , <i>Ficus religiosa</i> , <i>F.arnottiana</i> , <i>F.benghalensis</i> , <i>Kickxia ramosissima</i>
VI	Scrub at middle slopes with sparse vegetation cover	<i>Wrightia tinctoria</i> , <i>Securinega leucopyrus</i> , <i>Woodfordia fruticosa</i> , <i>Grewia flavescens</i> , <i>Dichrostachys cinerea</i> , <i>Boerhaavia diffusa</i> , <i>Zinnia elegans</i> , <i>Apluda mutica</i>
VII	Open low land scrub with sparse vegetation at foothills	<i>Tephrosia purpurea</i> , <i>Melanocenchris jacquemontii</i> , <i>Aristida adscensionis</i> , <i>Dichrostachys cinerea</i>
VIII	Aquatic	<i>Acacia senegal</i> , <i>Prosopis juliflora</i> , <i>Acacia leucophloea</i> , <i>Azadirachta indica</i> , <i>Boswellia serrata</i> , <i>Lantana camara</i> , <i>Lannea grandis</i>

Table - 2: Sighting records of vultures in Sajjangarh Wildlife Sanctuary

Species	Date	Number of individuals	Remark
<i>Sarcogyps calvus</i>	23.8.2003	1	Perching on tree near road
	26.2.2004	1	Perching on a tree near Gorella view point
	16.3.2004	1	Perching on a tree near Rana Pratap natural trail
	24.5.2004	1	Feeding on a carcass of a cow
<i>Gyps indicus</i>	24.5.2002	13	Feeding on a carcass of a cow
<i>Gyps bengalensis</i>	24.5.2002	21	Feeding on a carcass of a cow
<i>Neophron percnopterus</i>	24.5.2002	11	Feeding on a carcass of a cow
	15.4.2004	2	Pair was seen nesting on cornice of Monsoon Palace

Table – 3: List of threatened birds of Sajjangarh Wildlife Sanctuary (IUCN 2008)

NS.No.	Category	Species (Common name)	Occurrence Zone	Altitude wise zonation
11	Critically Endangered	<i>Sarcogyps calvus</i> (King vulture)*	IV	second zone
		<i>Gyps indicus</i> (Long-billed vulture)*	VIII	first zone
		<i>Gyps bengalensis</i> (White-rumped vulture)*	IV	first zone
22	Endangered	<i>Neophron percnopterus</i> (Egyptian vulture)*	IV	first zone
33	Vulnerable	<i>Parus nuchalis</i> (White-naped tit)*	II and VII	first zone
4	Near threatened	<i>Threskiornis melanocephalus</i> (Black-headed ibis)**	VIII	first zone
		<i>Mycteria leucocephala</i> (Painted stork) **	VIII	first zone
		<i>Phoenicopterus minor</i> (Lesser flamingo) **	VIII	first zone

Terrestrial birds* Aquatic birds**