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Status of Raptors Status and their preferred micro habitats in and around Sariska Tiger Reserve, Alwar, Rajasthan, India.

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ABSTRACT:

The presence of raptors in Sariska Tiger Reserve adds another fascinating layer to the ecosystem. Species Diversity: Bird checklists for Sariska indicate a healthy raptor diversity. Species like the Crested Serpent Eagle and the Indian Scops Owl are inhabitants of this place. Habitat loss due to deforestation and encroachment is likely a threat to raptor populations in Sariska, as it is for many wildlife species. Additionally, the use of pesticides in nearby agricultural areas can indirectly affect raptors through prey contamination. Raptors within Sariska likely exhibit a preference for specific microhabitats that provide them with hunting advantages and nesting opportunities. Here are some potential microhabitat preferences: Rocky outcrops and cliffs: These areas offer excellent vantage points for raptors to survey their territory and spot potential prey. Open woodlands and grasslands: Open areas with scattered trees provide hunting grounds for raptors that rely on speed and agility to capture prey. Riparian zones (river edges): These areas can be rich in prey like small mammals and birds, attracting raptors that specialize in hunting along water bodies. Dense forests: While not their primary habitat, some raptor species like forest eagles might utilize denser forested areas for nesting and roosting. Detailed studies on raptor populations within Sariska are needed to understand their specific status, habitat preferences, and potential threats. Such information is crucial for developing effective conservation strategies for these top predators. By protecting raptors and their preferred microhabitats, we can maintain a healthy balance within the Sariska ecosystem. Raptors play a vital role in controlling populations of small mammals and reptiles, ensuring a balanced prey base for other carnivores.

KEY WORDS: Sariska Tiger Reserve, Microhabitats, Raptors, Ecosystem, Deforestation, Habitat

Introduction

Raptors found worldwide and in all types of habitats. The birds of prey are among the most dramatic of all the birds. Their impressing appearance, spectacular hunting techniques and mastery of the air have inspired generations of bird watchers. Raptors in general large, heavy backed, big fooled, large claws, used for catching and killing prey. But these birds also have acute binocular vision and excellent hearing. Most species of raptors subsist mainly on live prey which they generally capture on ground, on trees and sometime in air, except most vultures because they completely depend on dead carcasses.

The birds of prey or raptors make up the large order falconiformes, with nearly 300 species ranging through the world. At Sariska Tiger Reserve I have two families: Accipitridae and Falconidae.

Out of nine species of vultures found in India (Ali and Replay, 1987). Seven species have been observed in Rajasthan and Gujarat, viz. the King vulture (*Sarcogyps calvus*), Cinereous vulture (*Aegypius monachus*), Egyptian vulture (*Neophron percnopterus*), Eurasian griffon (*Gyps fulvus*), Himalayan griffon (*Gyps himalayensis*), Long-billed vulture (*Gyps indicus*) and White-rumped vulture (*Gyps bengalensis*) (Chhangani et. al. 2002; Chhangani, 2005). Of these, the four species, King vulture (KV), Long-billed vultures (LBV), White-backed vulture (WBV) and Egyptian vulture (EV) are residents and breeds in and around the Sariska Tiger Reserve.

It is interesting to report that Long-billed vulture (LBV) in this part nests and roosts on cliffs and White-backed and King vulture's nests on large and medium trees. They were sighted less in nos. compared to LBV.

Material and Methods

Study site: Sariska Tiger Reserve is a tiger reserve in Alwar district, Rajasthan, India. It stretches over an area of 881 km2 (340 sq mi) comprising scrub-thorn arid forests, dry deciduous forests, grasslands, and rocky hills. This area was a hunting preserve of the Alwar state and was declared a wildlife sanctuary in 1958. It was given the status of a tiger reserve making it a part of India's Project Tiger in 1978. The wildlife sanctuary was declared as tiger reserve and national park in 1982, with a total area of about 273.8 km2 (105.7 sq mi). Altitude varies from 900 to 3200 feet metric system above a level. Sariska is characterized by distinct winter, summer and monsoon. During summer, temperature fluctuates between 30 – 35oC, and reach may 48oC during May and June. Mean winter temperature is 5oC, and may go down to 2oC during December – January. The average annual rainfall is about 825 mm; minimum 423 mm and maximum 950 mm. This wide range of climatic conditions along with the great altitudinal variations provides different micro- habitats. There fore, this sanctuary encompasses different vegetation types such as deciduous, dry-deciduous, dry-savannah-forest, euphorbia scrub and dry grasslands. The forest is dominated by 'gorya dhawa' (*Anogeissus latifolia*), dhawa (*A. pendula*), salar (*Boswellia serrata*), gol (*Lannea coromandelica*), kherni (*Wrightia tinctoria*), kumbat (*Acacia senegal*), khair (*A. catechu*), ber (*Zizyphus mauritiana*), dhonk (*Butea monosperma*), etc. The undergrowth mainly consists of jharber (*Z. nummerlaria*), ardnsa (*Adhatada vasica*), gangan (*Grewia tenex*), franger (*G. flavescens*), kanter (*Capparis separaia*), lantana (*Lantana indicus*), etc. Some climbers and grasses are also found.

The main fauna of Sariska includes Tigers (*Panthera tigris*), leopard (*Panthera pardus*), hyaena (*Hyaena hyaena*), Indian Wolf (*Canis lupus*), Jackal (*Canis aureus*), Sloth bear (*Melwisus ursinus*), Hanuman langur (*Semnopithecus entellus*), Rhesus Macaque (*Macaca mulatta*), Porcupine (*Hystix indica*), Fourhorned antelope (*Tetracerus quadricornis*), Chinkara (*Gazella g. bennetti*), Porcupine (*Hystrix indica indica*), Samber (*Cervus unicolor*), Spotted dear (*Axis axis*), (Bluebull (*Boselaphus tragocamelus*), Toddy cat (*Paradoxurus hermaphroditus*), Jungle cat (*Felis chaus*), Fox (*Vulpes bengalensis*), Crocodile (*Crocodylus palustris*) and Rock python (*Python molurus*).

Methods: Data was collected as and when encountered during travelling and regular field visits recorded from December 2016 to December 2018 in and around Sariska National Park. The aim of this study was to ascertain the nature of birds of prey in various microhabitat types in and around SARISKA TIGER RESERVE. Besides this scane sampling and ad-libitum sampling methods (Altamann, 1974) were also used to collect additional information by direct observations. Photography and videography were also done to confirm the presence of reptors in the study area. The sanctuary itself has no human inhabitants though two small villages are surrounded by the park's boundaries. Some 94,388 people live within five kilometers of the boundary of the park, in 33 settlements and a number of small satellites. The twelve largest and most proximate villages flanking the reserve are home to more than 43,100 people. Over 2 lac animals, which includes about 29200 cows, 18900 buffalos, 90500 sheep, 5500 goats and 4800 camels are living in and around the sanctuary.

Picture 1: Cow, *Bos indicus*

Picture:2. Camel, *Camelops spp.*

A series of transact and quadrates that were laid in the sanctuary for intensive wildlife and vegetation survey were used. Besides this, birds were recorded by point count methods in the major vegetation types as well as at water bodies (rivers, dams) and in agro-ecosystems for the six-year period. Apart from this, chance encounters were also recorded while following langurs. All identifications were based on Woodcock (1980), Ali and Ripley (1987), Grewal (1995) and Kazmierczak, (2000) and only those species with confirmed identification are listed in this paper.

Results and Discussion

A total of 201 species of birds have been recorded in the Sariska Tiger Reserve. In comparison to 123 birds given in earlier management plan for the 2000-01 by state forest department, and 72 birds species sighted at Mount Abu the highest altitude region of Aravalli region with good rainfall and forest (Devarshi and Trigunayat, 1989). Out of these 201 species, 23 are of raptors. Of which 19 species were belong to family Accipitridae and four species belongs to family Falconidae.

The wide range of climatic conditions along with the great altitudinal variations provides different microhabitats like deciduous, dry-deciduous, euphorbia scrub, dry grasslands, wetlands and agro-ecosystems. These microhabitats are suitable for variety of insects, reptiles, birds, amphibian, fish and mammalian fauna, which made a perfect prey base for the variety of raptors. The common observed prey (food items) of all these raptors along with the preferred micro-habitat at SARISKA TIGER RESERVE are given in table-1.

Table-1: Raptors of Sariska Tiger Reserve with Status and their preferred micro habitats.

S. No.	Name	Scientific Name	Status	Preferred Micro-habitats
1.	Black Kite	*Milvus migrans*	UC	1, 2
2.	Blackwinged kite	*Elanus caeruleus*	UC	4, 5, 6
3.	Crested hawk eagle	*Spizaetus cirrhatus*	UC	1,2,5
4.	Crested serpent eagle	*Spilornis cheela*	UC	1,2
5.	Indian longbilled vulture	*Gyps indicus*	UC*	2,3,4,6
6.	Indian whitebacked vulture	*Gyps bengalensis*	UC *	1,2,3,4,6
7.	Kestrel	*F. tinnunculus*	C	2,3,6
8.	King vulture	*Sarcogyps calvus*	R*	3,4,6
9.	Laggar Falcon	*F. jugger*	C	3, 4, 6
10.	Longlegged buzzard	*Buteo rufinus*	C	1,2,4
11.	Marsh harrier	*C.aeruginosus*	C	2,5
12.	Montagu's harrier	*C.pygargus*	R	2,5
13.	Oriental honey buzzard	*Pernis ptilorhynchus*	UC	1, 2, 4
14.	Pale-harrier	*Circus macrourus*	R	2,4,5
15.	Pariah kite	*Milvus migrans govinda*	C	3, 6
16.	Peregrine falcon	*Falco peregrinus*	R	4,6
17.	Red necked falcon	*Falco chicquera*	UC	3,4,6
18.	Scavenger vulture	*Neophron percnopterus*	C	3,4,6
19.	Shikra	*Accipiter badius*	UC	2, 4, 6
20.	Short-toed eagle	*Circaetus gallicus*	C	1,2
21.	Sparrow-hawk	*A.nisus*	C	1, 2, 6
22.	Tawny eagle	*Aquila rapax*	C	3,4,6
23.	White eyed buzzard	*Butastur teesa*	C	1, 2, 5

C - Common; R - Rare; UC - Uncommon; VC - Very common
** - Listed in threatened birds of the world (IUCN red list-2000)*

1. Deciduous
2. Dry-Deciduous
3. Euphorbia scrub
4. Dry grassland
5. Wetland
6. Agro-ecosystem.

Out of 4 resident species, long-billed vulture, white-backed vulture and king vulture were observed in and around SARISKA TIGER RESERVE. Nesting sites are very important for all raptors. The population and nest success in some parts depends primarily on the availability of nesting sites (Newton, 1979). Reduction in the availability of safe nesting sites can severely reduce the breeding success. It was observed that many nesting sites of long-billed and white-backed vultures have come under heavy mining and deforestation in the study area. This appears to be the important cause of vulture population decline (Chhangani, 2005). Decline in breeding success due to decrease in preferred breeding habitat has been reported in many bird species (Gole, 1989; Newton, 1979).

During the normal rainfall years, when all dams and water bodies in and around SARISKA TIGER RESERVE area get filled up to their capacities there is obviously no scarcity of food materials (aquatic as well as terrestrial) which is perhaps enough for resident and migratory raptors of SARISKA TIGER RESERVE. The cattle population in and around the sanctuary is very high about 148900 animals which includes 29200 cows, 18900 buffalwes, 90500 sheeps, 5500 goats and 4800 camels (Chhangani, 2002) regular natural deaths of these domestic animals provide enough food for resident vultures. During normal rainfall years, when all dams and waterbody in and around SARISKA TIGER RESERVE area get filled to their capacities there is obviously no scarcity of food materials (aquatic as well as terrestrial) which is perhaps enough for the both migratory and resident and migratory avifauna (Chhangani, 2002). Also the number of undisturbed trees, rocks, cliffs and small islands in the reservoirs provide enough "safe places" for nesting and roosting of raptors. These are the main reasons for the attraction of resident as well as migratory raptors.

Threats: Although some studies suggest that the "diclofenac" is the main cause of Gyps vulture decline, but in this study, we failed to confirm this hypothesis and found several other causes of vulture mortality over "diclofenac". In our opinion these causes are more important and need further investigation without further loss of time. The main causes of mortality in and around SARISKA TIGER RESERVE is hunting and disturbance. Many tribal areas in parts of Aravallis are dominated by indigenous communities like 'Bheels' and 'Garasiyas'. They were observed hunting vultures for feathers to prepare bows and arrow.

In addition to this threats there are several other important threats were observed in this study like deaths in road accidents, habitat loss and predation outside the SARISKA TIGER RESERVE, weather, miss fledging, scarcity of nesting material, disturbance by humans, etc.

In the last 10-15 years the traditional agricultural practices have changed drastically in and around the SARISKA TIGER RESERVE study area. The practices of fellow, agro-pasture practices, crop rotation and cropping without large trees, etc. is getting rarer. Intensive agriculture using flood irrigation, the crop is left without trees in the field. Tree species are replaced by species like *eucalyptus*, *prosopis juliflora*, etc. which reduces the nesting choice.

Out of 23 species of raptors found in SARISKA TIGER RESERVE, three species are listed in "Threatened Birds of the World" (Birdlife International 2000). Of these two species *Gyps bengalensis* and *Gyps indicus* are categorized as "critical", one species *Sarcogyps calvus* as "near threatened".

Now SARISKA TIGER RESERVE is under various biotic and abiotic pressure due to which sanctuary facing several threats from tree cutting, road accidents, forest fire, mining, etc. (Chhangani, 2001) which

leeds to habitat loss and unavailability of safe and enough nesting, roosting sites for the raptors at SARISKA TIGER RESERVE. This needs to be halted.

Habitat Contamination by the Pesticides

Another potential threat which has been quite neglected by the wildlife researchers till date is pesticide contamination through the consumption of the pesticide contaminated food and water by vertebrate pests. Usually around the wildlife habitats there are crop fields which are the perfect sites for the application of the fertilizers and pesticides. This aspect needs to be highlighted here is the pesticide contamination of the environment leading to the decline in the population of the animals especially by organochlorine pesticides (OCPs). Since many animals live in water and on shores and thrive on fishes and other aquatic animals therefore, they get exposed to OCPs because of bioconcentration and biomagnification of these xenobiotics. Here an example of bald eagle from USA needs to be considered. The bald eagle is the North American species with a historic range from Alaska and Canada to northern Mexico, is the national bird of the USA which has been an endangered species for many years. The reasons being the Habitat destruction and degradation, illegal shooting, and the contamination of its food source, because of DDT contamination, there is a decline in the eagle population, The banning of DDT by the Federal government of USA and related pesticides, habitat protection done by the Endangered Species Act, and conservation actions taken by the general American public have helped bald eagles to survive. Nevertheless DDT and its residues contaminated nearby water areas, where aquatic plants and fish absorbed it and biomagnified it . Bald eagles, in turn, were poisoned with DDT as and when they consumed the contaminated fish. As a consequence, their eggs had shells so thin that they usually broke during incubation or otherwise failed to hatch at all. DDT contamination and its residues also affected other species such as peregrine falcons and brown pelicans. Many Other pesticides having the same structure as DDT are suspected to have caused increased death, in addition to the harmful effects on reproduction. By 1963, with only 417 nesting pairs of bald eagles existing, the species was facing the danger of extinction. At the time, a controversial step of banning the use of DDT and some related pesticides in the United States was taken by the federal government of the USA. That was in 1972, and it was the first step on the road to recovery for the bald eagle (U.S. Fish & Wildlife Service Migratory Bird Program, February 2021). This shows how dangerous DDT contamination is how disastrous it can be for the avian fauna. More scary studies have indicated that we have largely over looked the darker side of these chemicals as OCPs are reported to be carcinogenic (Mathur et al, 2002 & Ingber et al 2013) mutagenic (Ingber et al 2013&Yaduvanshi et al 2012) teratogenic (Yaduvanshi et al 2012 & ATSDR. Atlanta, GA.1994) immunosuppressive (Repetto. R & Baliga. S.S, 1997 & Corsinia et al, 2003) create endocrine dysfunction such as hypothyroidism or high estrogenic activity (Dewailly et al, 2000 & Rathore et al, 2002) disturb reproductive processes (Pant et al ,2007 & Tiemann.U. 2008) growth depressants (Colborn et al, 1993 & Mercier. M, 1981) induces several psychogenic and neurogenic abnormalities in adult stages (Mactutus & Tilson, 1986 & Van Wendel de Jood et al,2001) and are associated with abortions, premature deliveries, still births and infants with low birth weights (Saxena et al, 1981; Saxena et al, 1980; Tyagi et al 2015; Chen. Q et al 2014 & Sharma & Bhatnagar, 1996). OCPs have been in use in India nearly for a half century now. Even after having clear cut evidence suggesting that these chemicals have the ability to eliminate entire species from the planet, the annual consumption of pesticides in India is about 85,000 tons of which OCPs comprise

the bulk (India Environment Portal Knowledge for change, 30/10/1998.). Therefore, today OCPs are perhaps the most ubiquitous of the potentially harmful chemicals encountered in the environment and are still widely detected in humans despite the considerable decline in environmental concentrations (Dewan et al. 2003). This kind of environmental Contamination with organochlorine pesticides (OCPs) has also been reported by Sharma and her coworkers in 1996, from Jaipur City. She reported contamination of human samples like mothers' blood, cord blood, placenta and mothers' milk with OCPs. Presence of pesticides with OCPs shows that how these xenobiotics have contaminated our Mother Nature and now faunal diversity is facing danger of existence and Smooth-coated Otters is not staying away from this potential danger. It can be concluded that the magnitude of pollution is quantitatively enough to contaminate the food and environment and reaching out to all faunal diversity. It can be concluded that the magnitude of pollution is quantitatively enough to contaminate the food and environment and the pesticides reach the human body through various sources mainly by absorption form the gastrointestinal tract through contaminated food chain, are circulated in blood, stored milk and secreted during lactation resulting in sufficient neonatal intake. The battle against the harmful insects would be much less costly and more efficient, and the problem of contamination of the environment by toxic materials would be vastly reduced, if insect activities are controlled by natural means. The use of pest-specific predators; parasites or pathogens; sterilization of insects with the help of radiations; trapping insects using insect attractants like pheromones; use of juvenile hormones or hormone inhibitors may therefore be suggested as alternate ways of pest control (Sharma, 1996; Sharma & Bhatnagar, 1996 & 2017, Sharma, 2018).

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