Biological Forum – An International Journal **10(2): 90-95(2018)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

A preliminary study on Nest Site Selection by Egyptian Vultures in Uttar Pradesh, India

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(Received 01 September 2018, Accepted 26 October, 2018)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Egyptian Vultures maintain their territories and generally built several nests during their breeding season. They select a breeding place in cliff sites of smaller size, on sheltered or camouflaged narrow ledges or equivalent caves, tall trees, ancient monuments and on old and historical temples where two eggs are laid early in the spring and where other competitors like black kite and other vultures are generally not present. During the study period four districts of Uttar Pradesh: Unnao, Rae-bareli, Lakhimpur Kheri and Gonda respectively have been surveyed for searching and observing the nest habitat preference of Egyptian vultures from June 2015 to September 2017. The objectives of the study were, to determine the factors influencing the nest site selection of Egyptian vultures. A total point count has been used to assess the breeding population of the Egyptian vulture. The nests found were mainly at the remote areas where there is least human disturbance and usually away from the main road. The field studies showed that Egyptian vultures prefer to nest at the sites that are close to suitable feeding habitat, water body (river, lake, pond, artificial water body etc).These species are social in behavior as they feed and roost in association with other birds like Black kites, crows, cattle egrets and mammals like dogs and pigs. It has been observed that unlike other vulture species they build their nest near sparsely populated human habitation. They prefer mature trees to build their nests probably due to the fact that large trees are necessary to hold their heavy nests.

Keywords: Umbrella species, Conservation, Nesting substrate, Nest site

How to cite this article: Shivangi Mishra, Adesh Kumar and Amita Kanaujia (2018). A preliminary study on Nest Site Selection by Egyptian Vultures in Uttar Pradesh, India. *Biological Forum – An International Journal*, **10**(2): 90-95(2018).

INTRODUCTION

The Egyptian vulture is considered an umbrella species, whose conservation will also substantially benefit other vulture species, and other raptor species of priority for conservation and hence the investigation of the habitat requirements of endangered species is crucial to many aspects of conservation. They maintain their territories and generally built several nests during their breeding season. They select a breeding place in cliff sites of smaller size, on sheltered orcamouflaged narrow ledges or equivalent caves, tall trees, ancient monuments and on old and historical temples where two eggs are laid early in the spring and where other competitors like black kite and other vultures are generally not present.

Egyptian Vulture (also known as Pharaoh's chicken) is one of the most commonly seen species of all the eight species of vultures found in Uttar Pradesh, India. Habitat preference for nesting, food and water availability, arethe basic requirements for animal's survival; consequently, it is a fundamental component to identify the habitat exploitation, population compactness and endurance of the animal. Egyptian vultures maintain their territories and generally built several nests during their breeding season. The first step is the selection of a breeding place in cliff sites of smaller size, on sheltered or camouflaged narrow ledges or equivalent caves, trees, ancient monuments, and temples usually where other competitors like black kite and other vultures are not present.

The competition for nest site selection amongst raptors is not any unusual phenomena and it has been recorded many times in many places of the world and between different species, for example: in Spain the competition between: Bonelli's Eagle and Griffon Vulture, Bonelli's Eagle and Peregrine falcon, between Bonelli's Eagle and Golden Eagle, were recorded (Ontiveros *et al.*, 2008). Eurasian Griffon compete extensively with Lammergeiers for nest sites in Europe (Fernández & Donázar, 1991; Margalida & Garcia, 1999; Bertran & Margalida, 2002).

There are evidences of interspecific aggression at the nest sites also has been observed between Cinereous Vultures and Eurasian Griffon (Blanco *et al*., 1997), between Eurasian Griffon and Egyptian Vultures (Pascual & Santiago, 1991), and between Cinereous Vulture and Bearded Vultures (Aykurt & Kiraç, 2001). They breed at selected sites, little visited by and even inaccessible to the other raptors and competitors generally in sparse human-dominated landscapes as they are opportunistic feeders and also utilize the waste generated by human beings in preparation of their nests. The present study aimed to identify the factors influencing the nest sites preferred by Egyptian vultures. The study sites should be protected and declared as the Important Bird Area (IBA) for the conservation of these endangered species.

MATERIALS AND METHODS

A. Study Area

The field work was carried out in four districts of Uttar Pradesh (Fig. 1). Uttar Pradesh is the fourth largest state of India, situated between 23°52'N and 31°28'N latitudes and 77°3' and 84°39'E longitudes. The state produces maximum buffalo meat and exports to other countries too.During the study period four districts of Uttar Pradesh: Unnao, Rae-bareli, Lakhimpur Kheri and Gonda respectively have been surveyed for searching and observing the nesting habitat preference of Egyptian vultures.

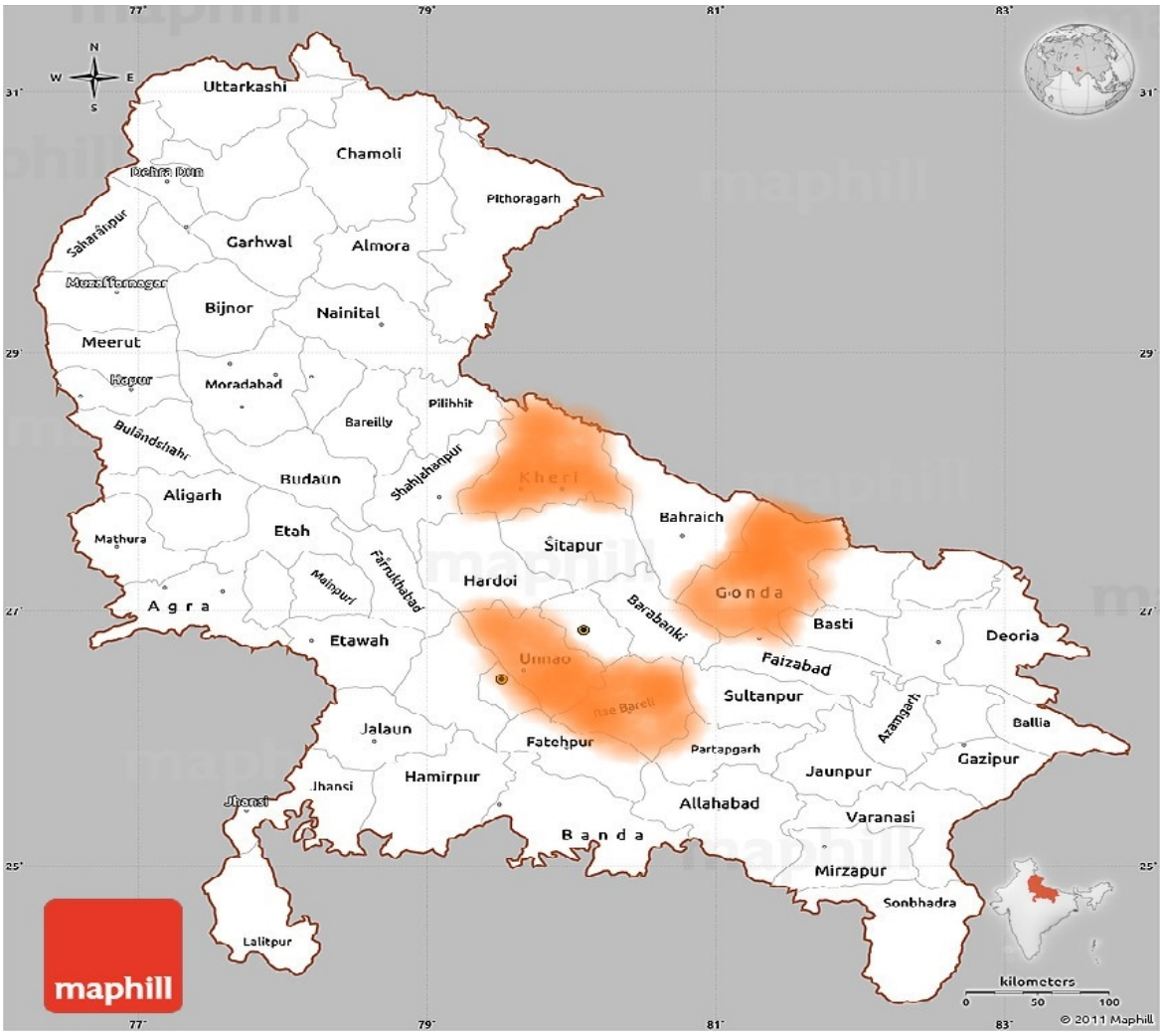


Fig. 1. Map showing the study areas in Uttar Pradesh, India.

B. Data Collection

During the study period four districts of Uttar Pradesh: Unnao, Rae-Bareli, Lakhimpur Kheri and Gonda respectively have been surveyed from June 2015–September 2016. Frequent stops were made along the routes offering suitable breeding habitat for Egyptian Vultures were checked for nests, using binoculars and a telescope.

The sky was scanned for vultures. The nesting sites were monitored by the observers and the photographs were captured by Canon 70D SLR Camera from the distance of >500 m so that the individuals could be studied and recorded without disturbing them. The Total count method was used to assess the population of Egyptian vultures at the breeding sites/ territory. To understand the habitat selection, the variables selected were distance from nearest road, water body, human habitation, nearest neighbor and substrate height. Nest site selection, nesting substrate, species, geographical coordinates, distance from nearest human habitation, distance from roads of nest sites, roosting sites and water body, geographical co-ordinates, has been recorded in order to understand the habitat selection.

RESULTS AND DISCUSSION

A total 20 nests were searched at different locations in five districts of Uttar Pradesh of which two productive, sixteen were occupied, one active and one nest was found destroyed by storm (Table.1). According to Postupalsky (1974), an active nest was defined as a nest in which eggs had been laid, whereas an occupied nest is one in which an egg need not have been laid, but a minimum of nest building must have taken place. The nests found were mainly at the remote areas where there is least human disturbance and usually away from the main road. The areas surrounded by tall tree species like *Eucalyptus*, *Azadirachta indica*, *Dalbergia sisso*, *Ficus religiosa*, *Ficus bengalensis* were preferred. A nest from which a chick fledged is termed as productive or successful. To understand the habitat selection, the variables selected were distance from nearest road, water body, human habitation, nearest neighbor and substrate height were studied (Table 2).

Nests of Egyptian vultures were found in remote excluded places with little human habitation. The old nests are often reused (Fig. 2). These species are social in behavior as they feed and roost in association with other birds like Black kites, Crows, Cattle egrets and mammals like dogs. It has been observed that unlike other vulture species they build their nest near sparsely populated Human habitation as they often utilize the waste generated by human beings. They use maximum percentage of anthropogenic materials in their nest construction too (Mishra *et al.*, 2017).

Table 1: Status and Type of Nests in different districts of Uttar Pradesh.

S.N.	District	Nest Site	Nest Status	Type of Nest	Elevation of Nest
1.	Rae-Bareli	All on Ancient Temples	6 (Occupied) 1(Productive) 1(Abandoned)	All Open	All above 70-80 ft.
2.	Unnao	*Ficus religiosa*	1 (Destroyed)	Large ,Open	10ft.
		Water tank	1 (Productive)	Very Large, Open	100ft.
3.	Lakhimpur – Kheri	Eucalyptus Tree	6 (Abandoned Nests)	All Large, Open	50ft.
4.	Gonda	*Ficus religiosa*	3 (Abandoned) 1 (Active)	Large, Open	40ft.

C. Statistics

Data for tested variables were collected for selected nesting site and non-selected substrate (Table 2; Fig..2). One Way ANOVA was performed to test for the significance of tested variables. As sample size was small we selected bootstrapping method to perform the analysis.

Table 2: Variables selected for assessment of Nest site selection by Egyptian Vulture.

Variables		Mean	F value (df=1,7)	P value
Distance from nearest road (m)	Selected Non-selected	167(38.91) 95 (20.32)	2.241	0.178
Distance from nearest Water body(m)	Selected Non-selected	369 (174.67) 1822(342.43)	16.279	0.005
Distance from nearest Human habitation(m)	Selected Non-selected	89 (36.35) 36(18.67)	1.591	0.248
Distance from nearest Neighbour(m)	Selected Non-selected	25(4.47) 64.25(12.16)	11.01	0.013
Substrate height (m)	Selected Non-selected	35.84(13.01) 27.06(4.31)	1.322	0.288

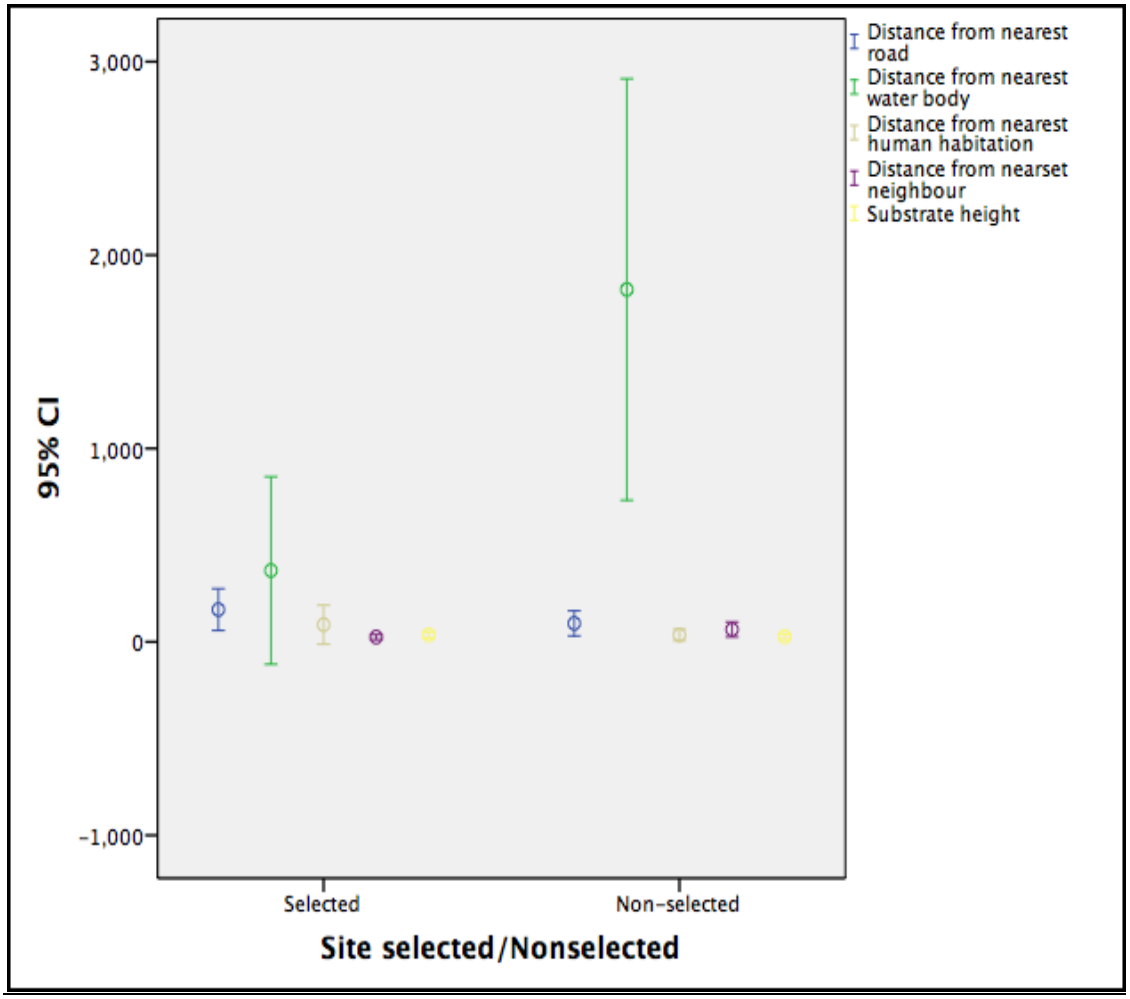


Fig. 2. Variables and their Confidence Interval obtained.

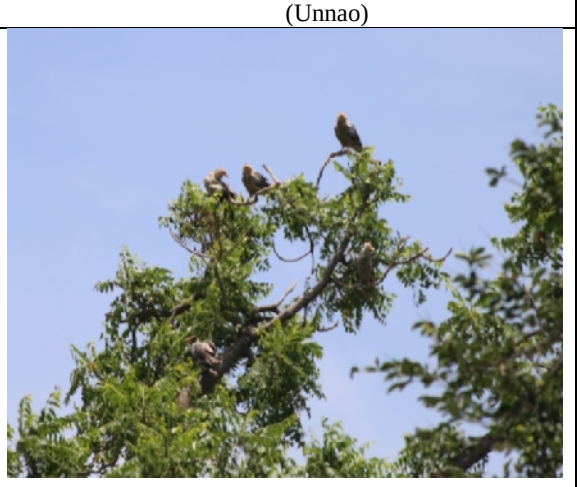
There is no nest of any other raptor found nearby the nest of Egyptian vultures. The competition for nest between different raptors is not any unusual phenomena, it has been recorded many times in many places of the world and between many species, for example: in Spain, Competition between: Bonelli's Eagle and Golden Eagle, Bonelli's and Griffon Vulture, Bonelli's and Peregrine falcon were recorded (Ontiveros *et al.,* 2008).

The interspecific aggression at nest sites also has been observed between Eurasian Griffon and Cinereous Vultures (Blanco *et al.,* 1997), between Eurasian Griffon and Egyptian Vultures (Pascual & Santiago, 1991). Habitat loss and alteration are the most serious threats to raptor populations (Newton, 1979). Recent studies suggest that the quantification of raptor habitat selection can make possible the prediction of species presence, and thus significantly contribute to the development of conservation measures for endangered species (Newton *et al.*, 1981; Donazar *et al.,* 1993; Austin *et al.,* 1996; Ferrer and Harte, 1997; Suarez *et al.,* 2000; Liberatori and Penteriani, 2001; Loyn *et al.,* 2001).

A. A Storm destroyed nest on Peepal Tree (Unnao)

B. A productive nest on water tank with juvenile sitting in nest and Adult roosting on top (Unnao)

C. A productive nest with a juvenile on Lord Shiva Temple (Rae Bareli)



D. Roosting on Neem Tree, Indra Udyan (Rae Bareli)

E. Number of Egyptian Vultures roosting on Non-functional electric tower nearby feeding site (Lakhimpur Kheri)

F. Questionnaire survey among local people

Fig. 3 (A-F). Showing the Nesting and Roosting of Egyptian Vultures in Uttar Pradesh, India.

CONCLUSIONS

Egyptian Vulture prefers high nesting platform usually located in undisturbed areas (away from human population) but close to good quality habitat (close to food and water resource). Nests made were close to other conspecific nest. They prefer mature trees to build their nests probably due to the fact that large trees are necessary to hold their heavy nests. Roosting and Nesting usually occurs within or immediately adjacent to water (Wetland, River, Pond or artificial water body). The minimum elevation of nest was around10 ft. and maximum elevation was above 100 ft. from the ground. Nests are generally Heavy, large and open with a number of materials used in it such as wool, cotton, bones, sticks, leaves, clothes etc. (Mishra *et al*. 2017). The nest with least elevation from ground was found destructed which shows that height from ground is crucial for the nest success. Among trees, they prefer mature trees to build their nests probably due to the fact that large trees are strong enough to hold their heavy nests. The study could help in developing strategies and plans for conservation of species and their habitat and will contribute to support the conservation of the Egyptian Vulture in big part of its global range.

ACKNOWLEDGEMENTS

Authors are thankful to the Head, Department of Zoology, University of Lucknow, for providing infrastructural facilities and encouragement to carry out research, University Grants Commission for the financial support. We also thank the Principal Chief Conservator of Forests, Wildlife Uttar Pradesh for providing permission in the study area. Uttar Pradesh Forest Department and Volunteers Shivam Mishra, Vandana Dhiman, Abhishek Shukla for their assistance during field observations.

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