



# Niche based nesting behavior and its conservation for sustainability of tallest flying bird, *Grus antigone antigone*

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## General Note



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## ABSTRACT

Sarus crane, *Grus antigone antigone* (Aves: *Guridae*) is a constituent to ecological landscape of district Fatehpur, Uttar Pradesh, India. A total of 20 nests of sarus crane were explored during investigation (June-December, 2017). The construction sites of nests were categorized according to niche or microhabitat (agricultural and nonagricultural wetlands, natural ponds, reservoir and marshy wetland etc.). The distribution pattern of nest sites was worked out over the landscape. The findings suggested that selection of

microhabitats for nesting were governed by openness, nest fabricating material, rainfall and topography. The more number of nests were recorded in nonagricultural marshy wetlands during investigation on the commencement of monsoon season where as the nest selection site shifted to the upper portion of water reservoirs and wetlands i.e. agriculture marshy wetland on mid monsoon. This pattern was associated with the depth of microhabitat and openness of land. The observations showed that microhabitat played a critical role in the success of eggs hatching and juvenile, predatory escape, availability of nest fabricating plants and food materials. Therefore, these microhabitats have very key role in the conservation for sustenance of sarus crane.

**Key words:** Sarus crane, Openness, Marshy wetlands, Niche, Nest fabrication.

## 1. INTRODUCTION

The Indian sarus crane (*Antigone antigone antigone*) is a tallest flying and non-migratory bird to be found in Indian subcontinent.<sup>[1]</sup> They are very noticeable and selective species of avian world, to open landscape of marshy wetland.<sup>[2]</sup> These birds are known for long-lasting pair-bonds and maintain territories within which they perform courtship displays. The main breeding period is rainy season, when the pair builds an enormous nest "island", a circular platform of reeds and grasses nearly two meters in diameter.<sup>[3]</sup>

The monopoly of the species in India is, it traditionally venerated and lives in or around agricultural lands. The northern populations are amongst the heaviest cranes and the largest in their home and nesting range.<sup>[4],[5]</sup> The anthropogenic activities destroyed marshlands, therefore, these cranes are increasingly dependent on wet paddy fields in India.<sup>[6]</sup> In rice-dominated districts of Uttar Pradesh, sarus crane abundance is highest. The profusion is positively associated with percentage of wetlands on the landscape and percentage of area under rice cultivation.<sup>[7]</sup> They preferentially use wetlands or uncultivated patches amid flooded rice paddies for nesting in India.<sup>[8],[9]</sup> Breeding pairs are territorial and prefer to forage in natural wetlands, though wet crops like rice and wheat are also frequented.<sup>[10],[11]</sup> In south-western Uttar Pradesh, sarus cranes were found in wetlands of all sizes with larger number in larger wetlands.<sup>[12],[13]</sup>

The sarus crane has been declared as 'State Bird' by the Government of Uttar Pradesh, India.<sup>[14]</sup> The Indian sarus crane has been listed as globally threatened which becomes vulnerable avian species due to efforts of conservators.<sup>[15]</sup> The conservative values of sarus crane and microhabitat as a very important aspect for its conservation. But the threat to this bird is still observed due to the deterioration of natural breeding grounds i.e. microhabitat by anthropogenic activities, patterns of agricultural farming and seasonal changes.<sup>[16]</sup>

The Gangetic plains and its surrounding agricultural landscape have the different types of microhabitat which succour sarus crane. Surroundings of these regions have agricultural and nonagricultural marshy wetland, pondles and paddy fields. The water depths and flora of microhabitats provides desire sites for fabrication of nest. The depth of microhabitats governs by rainfall and topography which influences the success of nest construction and breeding. Therefore, the microhabitats have conservative values for survival, hatching and natality of sarus crane. Perhaps, earlier surveys showed nest constructions sites were specific to location and individuals of crane pair. Therefore, the conservations of these microhabitats benefit directly to sustenance of sarus crane which is a crucial ecological component of observed landscape.

## 2. MATERIALS AND METHODS

### Study area

The district Fatehpur was founded by Rishi Purwar in the state Uttar Pradesh, India, situated between two holy rivers Ganga and Yamuna. The villages like Jahanpur, Chhivraha, Hussainganj, Asani, Bithaura, Dugari and few central localities including Khaga and Satnarayani were taken in consideration for investigations. The agricultural and nonagricultural, marshy wetlands in/ around selected sites were connected to several perennial and seasonal marshy wetland. The openness topography that was formed during the rainy season provided breeding ground for sarus crane. The climatic condition was very versatile. The maximum temperature recorded 48–50 °C during summer while minimum 1–3 °C was observed in winter season.

### Survey

The selected onsite survey was performed and findings were based upon the work conducted between June to December, 2017. Surveys were conducted in the first fortnight of each month. The observations of sarus crane nest were made while moving or/ and walking along the agricultural and non-agricultural natural marshy areas (Fig. 1). Identification of species was aided by using standard keys<sup>[17],[18]</sup>. Besides actual sightings, inquiries from local people (Mr. Santosh Kumar, Fatehpur, Uttar Pradesh) were also made to ensure the estimate of existing nests and their perceptions about the existence. The estimation of microhabitats was based

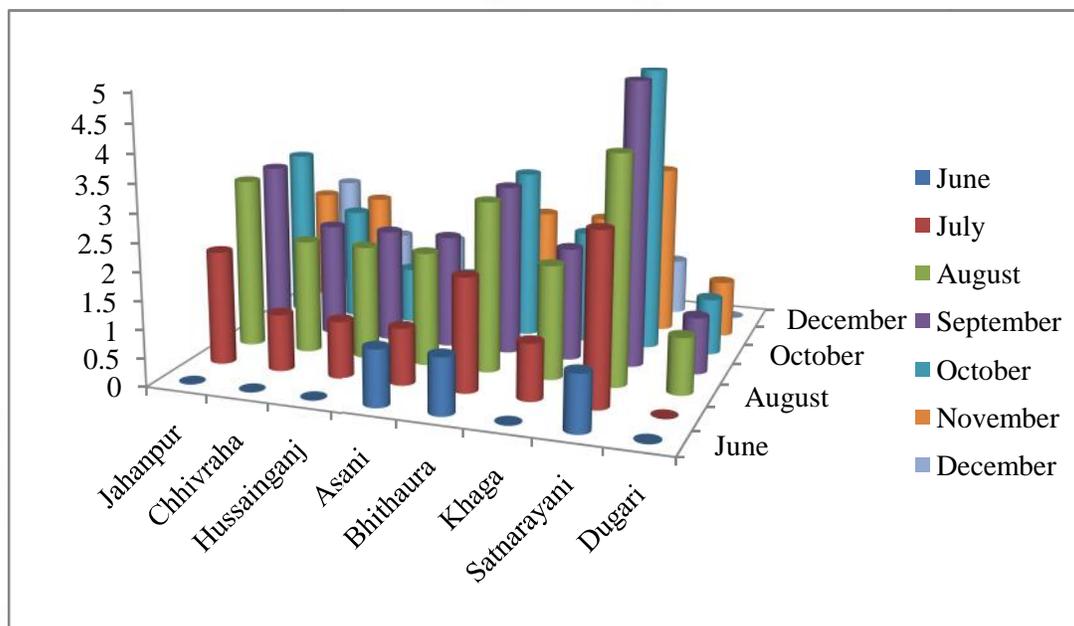
upon the onsite observations. The number of nest in agricultural and non-agricultural fields, in/around reservoir were located and recorded with respect to localities name and type of niche or microhabitat.



**Figure 1** Sarus crane is selecting nest fabrication site in its natural habitat

### 3. RESULTS

A total number of 20 nests of sarus crane were recorded during June to December, 2017. The behavior of nest fabrication was observed in the month of July-August, 2017. This behavior was not observed in early June and October onwards. The occurrence of nests per locality during period of investigation was worked out (Fig. 2).



**Figure 2** Month wise distribution of sarus crane nests in different area of investigation

The occurrence of nest in local areas was also recorded according to their niche and/ or microhabitat of agricultural and nonagricultural landscape (Table 1). Sarus crane constructed 13 nests in agricultural landscape (8 in cultivated lands like paddy fields, marshy neighboring marshy areas and 5 in noncultivated bandhs). However, 7 nests were fabricated in nonagricultural land (2, 3 and 2 in and/or nearby lake/reservoir, ponds and marshy wetland respectively). The availability of nests in microhabitat of various selected localities was well documented and presented according to microhabitat of agricultural and nonagricultural landscape.

**Table 1** Distribution of sarus crane nests in different microhabitat during study

S.N.	Site of observation	Nests in agricultural land		Nests in nonagricultural land			Total nests
		Cultivated	Noncultivated	Lake/ Reservoir	Ponds	Wetland	
1	Jahanpur	1	1	0	0	1	3
2	Chhivraha	1	0	1	0	0	2
3	Hussainganj	1	1	0	0	0	2
4	Asani	1	0	0	1	0	2
5	Bhithaura	1	1	0	1	0	3
6	Khaga	1	1	0	0	0	2
7	Satnarayani	1	1	1	1	1	5
8	Dugari	1	0	0	0	0	1
<b>Total</b>		<b>8</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>20</b>

#### 4. DISCUSSION

The breeding season of sarus crane was observed between middle July to early October and find corroborated to the observation of Kathju.<sup>[19]</sup> Sarus crane constructed more nest in already existing marshy water of perennial wetlands on beginning of monsoon, whereas it was comparatively less in its surrounding agricultural and nonagricultural landscape.<sup>[8],[9]</sup> The number of non-cultivated agricultural marshy wetland nests increased drastically in the middle of rainy season. This would be happened due to availability of optimum water depth on beginning of monsoon and less water depth of agricultural marshy wetland because sarus cranes prefer, openness of landscape and <2.5 feet depth of water for constructing nest.<sup>[2],[16]</sup> Commencement of winter season discouraged the cranes to construct nests. Consequently augmentation in the agricultural reservoirs encouraged the crane to constructs the nests to optimum water depth. It was also possible that the increased water level of agricultural lands reached the anthropogenic marginal area that inhabits the cranes to construct nests for safety purpose. The landscape of Satnarayani investigated maximum number of 5 nests among all agricultural nests because there were vast rain water marshy wetlands that encourage sarus crane to build nests for suitable depth and availability of foods.<sup>[16]</sup>

The earlier renowned workers reported that nest distribution pattern over agricultural landscape and opined that sarus crane preferred first non agricultural marshy wetland than agricultural wetlands for nest building due to activities of farmers in and consequently less survival of juveniles.<sup>[16]</sup> The availability of optimum water depth is related to the feeding of birds and survival of the nest. Therefore, the optimum depth of these microhabitats could not be ignored as nesting factors and conservation strategies must be considered.<sup>[16],[20]</sup> One important investigation came into light in the month of early October that some pre identified nests were traced out submersed in water and no farmers claimed the existence of juvenile. This observation raised the issue of optimum water depth of reservoir for success full egg hatching because it should be constant for thirty days of incubations periods. The observations made that the sinking of nest was also depends upon the nesting materials.<sup>[21],[22]</sup>

Based on the observations, it was hypothesized that unseasonal nesting of sarus crane could be due to (1) availability of more microhabitat, (2) few pairs raised 2<sup>nd</sup> brood, (3) failing breeding by few pairs in monsoon period instigate prompt them to nest again when prerequisite like flooded marshes stay behind, (4) openness of habitat and (5) availability of forage and nesting material.

#### 5. CONCLUSION

The findings suggested that microhabitats were governed by rainfall and topography which influenced the nesting behavior and selection of nesting sites. Therefore, the numbers of more nests were recorded in non agricultural wetlands on the beginning of monsoon. The nest selection site shifted to the upper portion of reservoir i.e. agriculture marshy wetland on mid monsoon. This pattern was associated with the water depth of reservoir and openness of land. The observations showed that niche/ microhabitat played a critical key role in the success of eggs hatching and juvenile, predatory escape, availability of nest fabricating plants and food materials. Therefore, the optimum depth of these microhabitats could not be ignored as nesting factors and conservation strategies must be considered. The authors supposed to propose these microhabitats have very important role in the conservation and sustenance of sarus crane.

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