Biological Forum – An International Journal **9**(2): 10-16(2017)

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

Habitat Preference and Social Composition of Sarus Cranes in Unnao District, Uttar Pradesh, India

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(Received 12 June 2017, Accepted 16 July, 2017)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The socio-ecological organizations of birds are complex, controlled by many factors, and organized in relation to the ecological factors especially plant species diversity, food dispersion and predator diversity and density. These ecological aspects influence the group size and composition of birds' species. The aim of the present study was to find out the habitat preference and social configuration of Sarus cranes Unnao district of Uttar Pradesh for its conservation significance as the habitat is being degraded rapidly due to increasing human population, industrialization, loss of habitat (rapid declining of wetlands) and other developing activities. The Sarus crane is listed as a Vulnerable category of IUCN Red list, 2010. The habitat preference and social composition of the Sarus crane was studied. Study was conducted in Unnao district, Uttar Pradesh from January 2015 to March 2016. It has been found that 3% of individuals of sarus crane were single, 10% in pairs and 87% in groups. The overall mean group size of sarus crane in the study area was 3.12±2.37. In conclusion, the abundance and density of Sarus Cranes had decreased and the social composition including group was different in the dry part of Unnao district in relation to existing population of these Sarus in other parts of their natural distribution.

Key words: Sarus Cranes, Unnao, Habitat preference and composition.

INTRODUCTION

The socio-ecological organizations of birds are complex, controlled by many factors, and organized in relation to the ecological factors especially plant species diversity, food dispersion and predator diversity and density. These ecological aspects influence the group size and composition of birds' species. The study of habitat uses and selection in birds hasa long tradition (Grinnell 1917, Kendeigh 1945, Svardson 1949, Hilden 1965; Block and Brennan1993). Early habitat-selection theory was characterizedby correlative models of habitat characteristicsand species abundance (MacArthur and Pianka1966, Verner *et al.* 1986, Rosenzweig 1991).A classic ecological study by MacArthur inspired many biologists to consider how plant foliage and diversities influence the distribution of bird species within a community (MacArthur and MacArthur, 1961).

Co-existence of species in a habitat is facilitate by differential use of food resources (Bagchi *et al.*, 2003). overlapping of food resources and intense competition was found among the species due to resource competition among species within a habitat(Madhusudan, 2004).

Preferred foraging habitats of cranes include shallow marshes, lakeshores, smallstreams, and upland pastures (Scott 1993). Roots and tubers, insects, snails, shrimps, fish, smallbirds and rodents are included in the diet of cranes (Bishop 1996).

Understanding habitat site selection characteristics is imperative for making conservation decisions on Sarus crane habitat, and managers usually lack such knowledge.Habitat establishment mayalso a great measure need used by the birds. The comparative use of habitat by birds willalso be affected by the presence (or absence) of otherresources or resource management, both locally andat the landscape scale.

The aim of the present study was to find out the habitat preference and social configuration of Sarus cranes in Unnao district of Uttar Pradesh for its conservation significance as the habitat is being degraded rapidly due to increasing human population, industrialization, loss of habitat (rapid declining of wetlands) and other developmental activities. The Sarus crane is listed as a Vulnerable category of IUCN Red list, 2010.

A. Study Area

Study was conducted in Unnao district, Uttar Pradesh from January 2015 to March 2016.This district lies between 26°.33'0" N and 80°.28'48" E (Fig. 1).

The maximum temperature recorded was 45.5 °C and minimum was 2.5 °C. The rainfall in study area often shows erratic nature and many times the area experiences long dry spells also. The average annual rainfall of the district is 838 mm. Almost 90% of annual precipitation occurs during the period mid-June to September.The study area is a part of the vast central Ganga Plain which is one of the physiographic units of India. Rivers Sai and Ganga form the north-eastern and south-western boundaries, respectively.

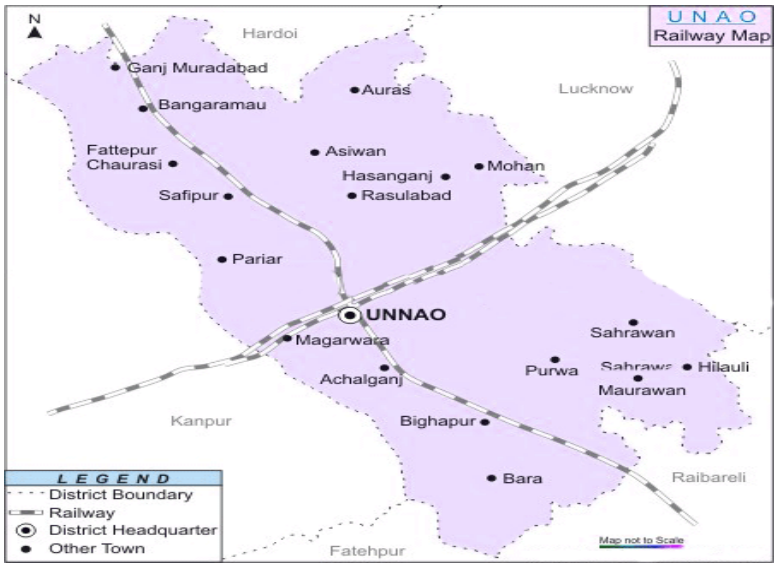


Fig. 1. Map of study area (Unnao district).

MATERIALS AND METHODS

A. Sampling design

The proposed study areawas divided into 5 × 5 km grids and surveyed the Sarus crane population by 1.5 km line transects within the randomly selected grids (Burnham *et al.*, 1980). A total of 160 line transects were surveyed during the study period (January 2015 to March 2016). The transect surveys were conducted during the morning and late afternoon hours according to seasons. Data were recorded on the species, no. of individuals, sighting distance from transect, activities of animal and habitat features.

B. Data analysis

The abundance and density/km^2 of the sarus crane in the study area were calculated from direct sighting data. Mean number of individuals in all types of habitat were also calculated. The number of individuals sighted from transects were analyzed by creating seven distance classes. The frequency of occurrence of various group sizes was also analyzed.

RESULTS AND DISCUSSION

A total of 1973 individuals of sarus crane recorded during the study period, by moving through the 160 number of line transects. Out of the 160 transect, 76 transects in agriculture and 84 transects in wetlands were surveyed during the study period. Sarus cranes were observed only in 139 transects.Several workers provided the evidences related to habitat use by Sarus crane in previous studies (Gole,1989; Chauhan and Kumar, 2000; Sundar *et al*., 2000a; Vyas, 2002; Aryal *et al.*, 2009).

A. Habitat preference

Out of total recorded population of sarus crane, 66% recorded in wetlands, 34% in agriculture habitat. On analysis of the population of sarus crane recorded during the study, the mean number of individual per transect of sarus crane was more in wetlands and less in agriculture, (Fig. 2). Sarus cranes prefer shallow area and avoid deep reservoirs and other wetlands for habitation (Borad *et al*., 2001), it prefers nesting in marshland and paddy rice (Sundar, 2009) of water depth varying between 25 and 65 cm (Mukherjee *et al*., 2000), population fluctuations across habitats by Sarus is extremely season dependent (Mukherjee., 1999).

The sighting of the population of sarus cranes in study area, it was documented that, the density of sarus crane in agriculture habitat greater than wetlands. The abundance of sarus crane in agriculture was less with compared to the wetlands habitat. It was also observed that, the density of sarus crane was more in agriculture habitat in comparison to the wetlands (Table 1). The analysis of the data on various distance classes from the premeditated transects indicate that, the maximum number of individuals of sarus crane recorded within 40 to 50 m in wetlands habitat in the study area.

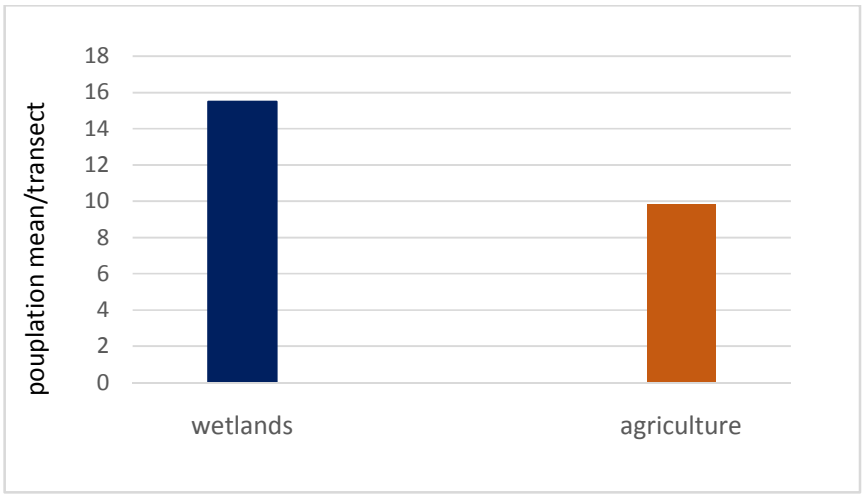


Fig. 2. Mean of the population of sarus crane in various types of habitat.

Table 1: Abundance and density of the sarus crane in the various habitats of the Unnao district.

SN	Habitat	Sarus crane		
		No. of evidences	Abundance	density/ km2
1	Wetlands	1301	15.4880	0.2918
2	Agriculture	672	8.8421	1.3614
	Total	1973	24.3301	1.6532

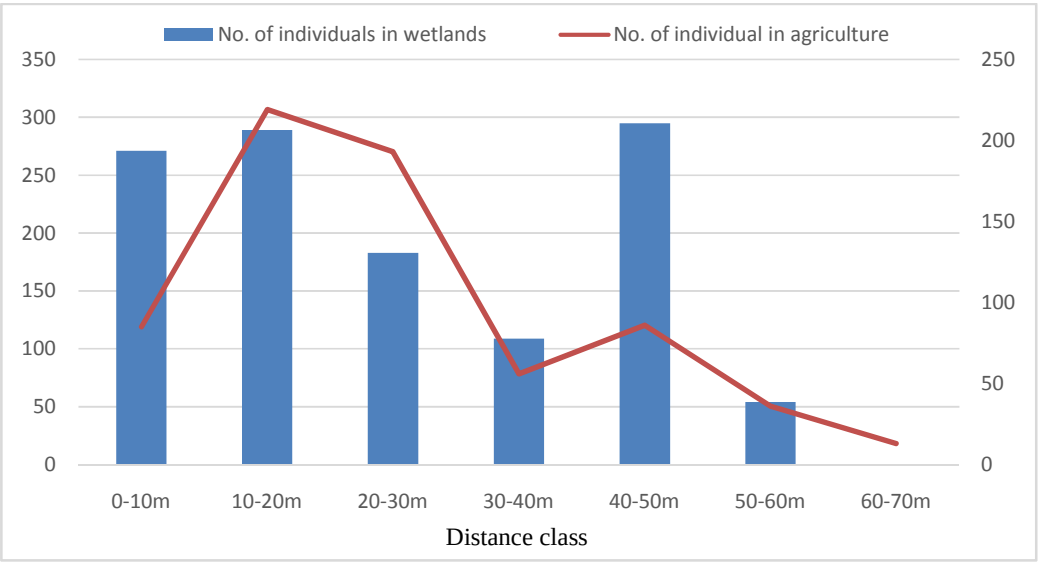


Fig. 3. Number of individuals of sarus crane in different distance classes from the transects.

Similarly, the foremost concentration of sarus crane population observed within 10-20 m distance from transects in agriculture (Fig. 3).

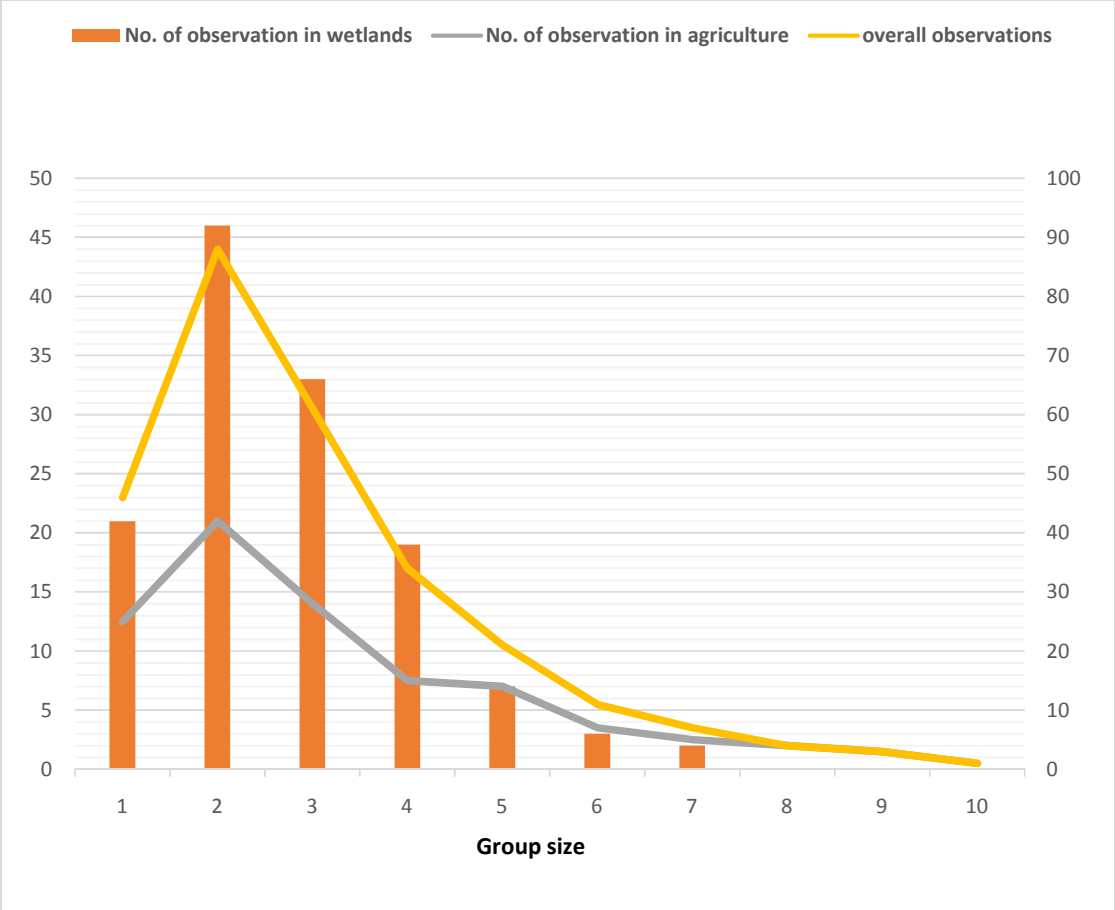
B. Social composition

A total of 1973 individuals (agriculture=672 and wetland=1301) of sarus crane were observed during the study period. Out of the 1973 individual of sarus crane, 1532 adult, 394 sub-adult and 47 juveniles were recorded. There are many records of social structural behavior of Sarus Cranes seen in pairs, or family groups, and congregation up to 250 birds during non-breeding season for finding the mate (Gole, 1991a & b; Vyas, 1999; Singh and Tatu, 2000; Sundar *et al.*, 2000b).

The results of the analysis of group size recorded during the study is also given below: -

Group size: on assessment of the population of sarus crane in Unnao district, it was found that 3% of individuals of sarus crane observed in single, 10% in pair and 87% in groups more than two individuals. The frequency of observation of various group size classes of sarus crane recorded during study is shown in Fig. 4 & 5.

The series of group size of sarus crane were recorded in the habitat were speckled between 1 to 10. The overall mean group size and standard deviation (SD) of sarus crane recorded in the study area was 3.12±2.37. The mean group size and standard deviation of the sarus crane recorded in major habitats of Unnao district is given in Table 2.



(**Legends:** Group size1=1, Group size2=2, Group size3=3-10, Group size4=11-50, Group size5=51-100,Group size6=101-150, Group size7=151-200, Group size8=201-250, Group size9=251-300,Group size10=301-350)

Fig. 4. Frequency of group size of sarus crane in Unnao district.

Table 2: Mean group size and SD of the sarus crane in various types of habitat.

SN	Habitat	Sarus crane (Mean±SD)
1	Wetlands	2.88±2.59
2	Agriculture	3.19±2.67
3	Overall	3.12±2.39

Fig. 5. Clock wise (A) Sarus crane IUCN Vulnerable (VU) Species as single (B) Sarus cranein pair (C) In a group of three (D) In a group of four (E) Mating dance of Sarus crane (F) Large flock of sarus crane in wetland (G) Large flock of sarus crane in agriculture habitat (H) Sarus crane in incubating position (I) Chicks with their parent (J) Sub-adults sarus crane with parent.

CONCLUSION

In conclusion, the abundance and density of Sarus Cranes had decreased and the social composition including group was different in the dry part of Unnao district in relation to existing population of these Sarus in other parts of their natural distribution. Importance for the conservation of sarus species. It is doubtful that entire sites in present densely populated Unnao district will continuously become availablefor Sarus crane conservation, and the proliferation of cultivation and harvestation at the cost ofwetlands areforthcoming.

Some areas in Unnao district are still providing excellent persistence of significant population of sarus crane. Conservation intrusions in these situations mustbe carefully considered. An improved considerate of the on-site situations could be used in conveying specific conservation plans for the species in the Unnao district.One of the conservation improvement strategies is that of promoting educational efforts on long-term basis by concentrating on the emotiveaffection of the local people, school children and farmers to the crane and by underlining the importance of sarus in the ecosystem. Habitat improvement by striking and reducing threats such as developmental activities, pollution, agricultural expansion, etc. in order to provide favourableenvironments could be a correspondingapproach of conservation and management.

ACKNOWLEDGEMENT

The authors wish to thank Head, Department of Zoology, University of Lucknowfor encouragement and research support. We also thank the Principal Chief Conservator of Forests, Wildlife Uttar Pradesh for providing permission in study area. Forestry personnel, local participants, school student and volunteers are also acknowledged for their support in counting and data collection.

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