

Population Status and Habitat Suitability of Sarus Crane (*Grus antigone antigone*, Linnaeus, 1758) in Banke District, Nepal

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Abstract: The Sarus Crane (*Grus antigone antigone*) is listed as “vulnerable” in the Red List of Threatened Species by International Union for Conservation of Nature (IUCN). The study was conducted from 1 November 2015 to 30th January 2016 to access the population status and habitat suitability of Sarus Crane in Banke District. Direct observation through line transects survey methods were used to estimate the population status of Sarus Crane. Geographic parameters of sighting points were recorded for determining habitat suitability. The conservation threats were analyzed by field, questionnaire surveys. The study areas contained 51 Sarus Cranes out of which 48 were adult and eight were chick. The Sarus Crane was found to use all habitats viz. farmlands, wetlands, grasslands. Farmlands and wetlands areas contained the highest number of Sarus Crane but preferred more farmlands for foraging followed by wetlands and grasslands. The frequency of the Sarus Cranes was highest in farmlands (62.74%), followed by wetlands (31.37%), and grasslands (5.88%). The continued expansion of agricultural land and the loss of natural wetlands habitats are the most serious threats to the species. Population monitoring, further research, increasing awareness to local people, protection and restoration of wetland, discourage of using insecticides, and chemical fertilizer are of the ways to save the Crane in Banke district.

Keywords: Habitat, Population, Sarus Crane, Threats, Nepal

1. Introduction

The Sarus Crane (*Grus antigone antigone*) has been listed as “Vulnerable” in the IUCN Red List of Threatened Species [1]. The Sarus Crane is one of the 15 known species of Crane in the world [2, 3]. Sarus Crane the world’s tallest flying bird [4], is the only resident breeding Crane in India and Southeast Asia [5]. The Sarus Crane is monogamous bird and also known as the eternal symbol of unconditional love and devotion and good fortune. Sarus Crane is known for its marital fidelity, believed to mate for life and pine the loss of their mates even to the point of starving to death [6].

The current range of the Indian Sarus Crane includes the plains of northern, northwestern, and western India and the western half of Nepal's Terai lowlands. The population has declined sharply over the last several decades. Sarus Cranes are most common and densely distributed in the Indian states of Uttar Pradesh, Rajasthan, Gujarat, and Haryana; they are less common in Bihar and Madhya Pradesh [7]. In the past, Sarus Crane was distributed in the entire lowlands from east to west; however, at present, its distribution is only recorded from Chitwan to Kanchanpur District of the western lower lands of Nepal [8, 9].

Sarus Crane is an omnivorous bird and maintains the food chain and food web furnish strength to wetlands ecosystem. Most of their nutritional requirements are available in natural wetlands, but due to increase in agricultural activity, Cranes are increasingly forced to use crops field for foraging [10, 11, 12]. The population of Sarus Crane is facing threats due to the destruction of its habitat, pollution, and agricultural development [11, 13]. Despite its long-recorded history, less research has been carried out in Nepal. However, there are limited studies focusing on habitat suitability and current

threats to Sarus Crane. In this study, we provide the current status of Sarus Cranes, their habitat suitability, and the current threats to Sarus Crane.

2. Study Area

Banke district lies in Teri region and situated in Bheri Zone of Mid-Western development region of Nepal. The district is located in the latitude of 27° 50' to 28° 20'N and the longitude of 81° 30' to 82° 10' E. The elevation of Banke is 174.63 and covers an area of 2337 square Km. Banke district expands in an area of 2337 square km between Bardiya, Salyan, and Dang districts of Nepal and Baharaich district of India [14] The study area primarily consists of forests, farmlands, wetlands, and Grasslands.

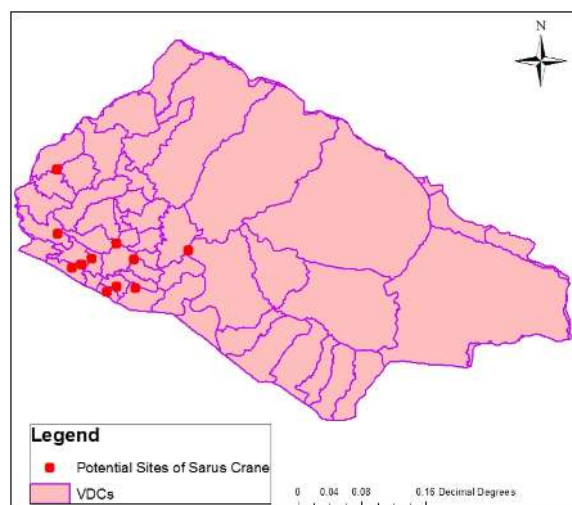


Figure 1: The study area where Sarus Crane was directly observed

3. Material and Methods

The study consisted of surveys conducted between 1 October 2015 to 30 January 2016. Population status and habitat suitability of Sarus Crane were determined by trial transect surveys. A total 75 transects of each 2.5 km were randomly selected. Out of 75 transects 30 on farmlands, 25 on wetlands and 20 on grasslands. Trial surveys were carried out by motorbike, rickshaw and foot walk for reaching the potential habitat of Sarus Crane. Any Sarus Crane observed with the necked eye and/or with binoculars within 1000m on either side of transects were recorded. Regular surveys were conducted in the morning between 6.00-10:00 hours and evening 14:00- 17:00 hours during the study period. Since the Sarus Crane is a huge bird and visible from a distance, therefore the counts were accurate survey. Information on the number and habitat types of each location of Sarus Crane was recorded. The total available habitat of Sarus Crane comprised of open area of farmlands, wetlands and grasslands. Logistic regression model was used to test the significant between the distributions of Sarus Crane in different habitat types (Habitat1 = Grassland/ Habitat2 = Farmland/ Habitat3 = Wetland) using Rstudio. Questionnaires survey was conducted to identify conservation threats to Sarus Crane in human interface in study area.

4. Results

During the survey, 51 Sarus Cranes were observed. There were 43 adults and eight were chicks. The estimated population density of Sarus Crane was 0.136 individual in per Sq. km. During the study period, Sarus Cranes were observed in single, pair and families.

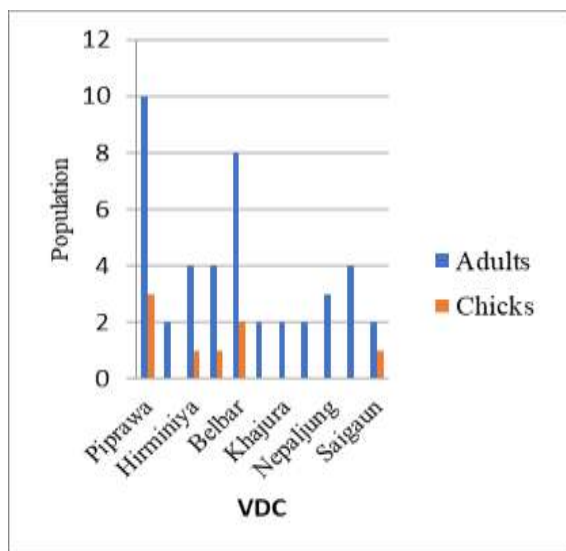


Figure 2: Population of Sarus Cranes in the study area

Among various habitat types, 62.75% of Sarus Cranes were sighted in farmland, 32% were sighted in wetlands and 5.88% in grasslands. From the Logistic regression analysis, farmland was positively significant ($p=0.0247$) so farmland was suitable for Sarus Crane.

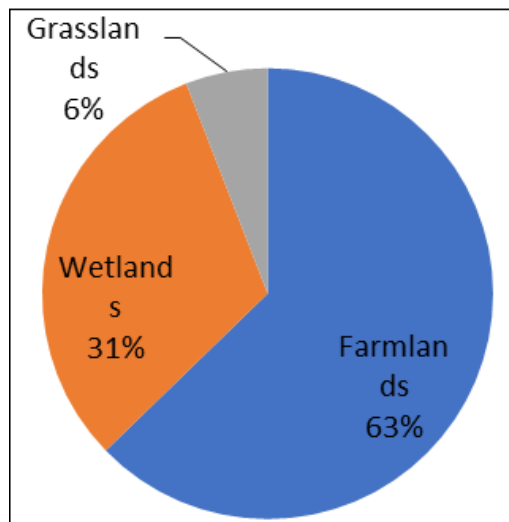


Figure 3: Pie-chart showing habitat used by Sarus Crane in Banke District

The major threats to the survival of Sarus Cranes in the study area were habitat destruction, drying of wetlands, destruction of natural wetlands, conversion of agricultural and wetlands for different industries, dam, road construction, stealing of eggs, people hunting for meat and the agricultural use of pesticides. During the study period, wetlands were drained to create agricultural land. The hunting of Sarus Cranes and stealing of eggs mainly by Muslim community was reported by the respondents. Among 230 respondents, 73.5% agreed with stealing of eggs of Sarus Crane, 6.1% agreed with the tradeoff of bodies of Sarus Cranes for meat and remaining 20.4% were unknown about the threats in the study area.

5. Discussion

There have been several studies on the population of Sarus cranes in Nepal. Gosai [12] counted the population of Sarus Cranes in Rupandehi District and found 143 Sarus Cranes, out of those 69 male Cranes, 68 female cranes, 2 juveniles and 4 were unknown. Aryal *et al.* [11] reported that the total available habitat of Sarus Crane in Rupandehi and Kapilvastu district was 868 sq. km and 938.04 sq. km respectively; and found total 100 number of Sarus Crane in Rupandehi district, out of them 76 were adults and 24 were chick and in Kapilvastu district, 68 Sarus Cranes were counted, out of them 55 were adult and 13 were chick. Whereas, the total available habitat of Sarus Crane in Study area was 375 sq. km and found 51 number of Sarus Cranes among which 43 were adults and 8 were Juvenile Cranes. The population density of Sarus Cranes in Banke district was 0.136 individual per square km. However, the density of Sarus Cranes in Rupandehi district presented by Gosai *et al.* [12] was 4.2 individuals per square km which was higher than my study area. The population density of Sarus Cranes in Rupandehi and Kapilvastu district carried out by was 0.1152 and 0.0725 individual per square km. This discrepancy could be the difference in the area covered during field observation, data generation, and calculation methods.

Sunder *et al* [15] also reported that the mosaic of wetlands and agricultural fields had perhaps contributed to healthy population of Sarus Crane in single, pair and families in the

districts of Etawah and Manipur in Uttar Pradesh, India. As our results, Sarus Cranes preferred paddy fields [15, 16], farmlands [11], agriculture fields [17] but some researcher [7,18, 6,19] found the Sarus Cranes preferring the natural wetlands as their habitats. The difference in these studies may be because of presence of large natural wetlands as compared to my study area and also might be due to large deforestation by the people who migrated to study area from North-South in the past decade and converted the forest land to farmlands in the study area. In Kapilvastu district, 51 Sarus Cranes were counted in farmlands and 17 in the wetlands whereas 67 Sarus Crane in the farmlands and 33 in wetlands in the Rupandehi district [11]. In addition 32 Sarus Cranes in farmlands, 16 in wetlands and three in grasslands from this study.

The major threats to the survival of Sarus Cranes in the study area are habitat destruction, drying of wetlands, destruction of natural wetlands, conversion of agricultural and wetlands for different industries, dam, and road construction, stealing of eggs which have been also reported by other researcher [11, 12, 20, and 21].

6. Conclusion

The population density of Sarus Crane in Banke District was very low (0.136/km²) due to lack of suitable habitats, particularly large wetlands and excessive human disturbances in the agricultural fields. The total population of Sarus Crane was found to be 51 individuals out of which 48 were adult and eight were chick. The Sarus Crane was found to use all available habitats, but analysis of the proportions of available habitat and frequency of habitat use clearly indicated that the Sarus Crane preferred farmlands followed by wetlands and grasslands. The population of Sarus Crane is found to be declining due to land use change particularly conversion of wetlands into agricultural lands and drainage of water, lack of awareness, use of agro-chemicals, over exploitation of wetland resources, disturbances in the foraging and nesting places.

In this scenario, we have recommended the following important findings of Sarus Crane conservation.

- The population size of Sarus Cranes in Banke district is very small and sparsely distributed, thus it is essential to monitor them to understand the population dynamics and movement.
- Sarus Crane conservation awareness program should be conducted in Banke district including students, farmers, and hunters and especially to the Muslim society of the study area.
- Sarus Crane Management Action Plan and Integrated Conservation Programmed are essential for proper Conservation of Sarus Crane in the study area.
- There should be wetland conservation area in order to provide additional habitat for Sarus Cranes.

7. Acknowledgement

We extend our sincere thanks to Prof. Dr. Ranjana Gupta, Head of Central Department of Zoology, Tribhuvan

University (CDZ, T.U.) for her kind cooperation. We are equally thankful to all the academic staffs of CDZ, T.U. for their support and encouragements. We would like to thank to local people who helped us by providing the related information during the survey period. We are grateful to our family and friends for their continuous encouragements and supports.

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