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Research paper

Population dynamics of Indian sarus crane, *Grus antigone antigone* (Linnaeus, 1758) in and around alwara lake of Kaushambi district (Uttar Pradesh), India

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Abstract

Sarus crane is the only resident breeding crane in India. They prefer open habitat like marsh areas, irrigated paddy fields, grass land and river banks. These areas suit them for foraging, roosting and nesting. These cranes are omnivorous birds, feeding aquatic plants, seeds, roots, tubers, crustaceans, insects, molluscs, fishes, frogs, reptiles and avian eggs. These are not only involved in maintaining the food chain and food web but also providing strength to wetland ecosystem. Ecological and environmental condition of this lake is nicely supporting the survival of vulnerable Indian sarus crane, *Grus antigone antigone*. In general, the population of sarus crane is decreasing at global level but the authors recorded its increasing trends during their exploration from 2011 to 2014 in and around the Alwara lake of Kaushambi district of Uttar Pradesh (India).

Keywords: Alwara Lake; Vulnerable; Sarus Crane; Sarus Safe Zone; Fish biodiversity; Population Dynamics; Increasing Trends; Conservation.

1. Introduction

The Indian Sarus Crane. *Grus antigone antigone* (Linnaeus, 1758) is the largest of the crane species found in India. It has been declared as State Bird by the Government of Uttar Pradesh. Its population density is inseparably associated with wetland habitats. The Indian sarus crane has been listed as globally threatened i.e. vulnerable avian species (Bird Life International) because of its declining numbers.

A few investigators (Chauhan R. and Kumar D. 2000; Sundar K.S.G, Chaudhary B.C. and Kaur J. 2000a; Sundar K.S.G., Chaudhary B.C. and Kaur J. 2000b; Sundar K.S.G. 2010; Jha K.K. 2014; Prakash S., Narain S. and Kumar S. 2014; Ansari N. A. 2015; Verma *et al*, 2015; Verma *et al*, 2016a; Verma *et al*, 2016b; Prakash *et al*, 2016a and Prakash *et al*, 2016b) have tried to study the demography, ecology and status of Indian sarus crane on large scale in Uttar Pradesh. Sundar K.S.G. and Choudhary B.C. (2003) gave the literature review of sarus crane in detail. As far as the study of this sarus crane in and around the Alwara lake is concerned, it is done only by few Zoologists like Verma *et al*, (2015, 2016a, 2016b and Prakash *et al*,(2016a), who reported an increasing population trend of Indian Sarus Crane in and around of this said lake.

A limnological, zooplanktonic, phytoplanktonic and ichthyologic study of this lake was done by Prakash *et al*, (2015a, 2015b, 2015c, 2015d and 2016c) and Verma *et al*, (2016c, 2016d and 2016e). Verma *et al*, (2016f) and Prakash *et al*, (2016d) worked a little on the nesting materials, their medicinal values and suitable selection of nesting sites of this crane.

Present exploration is aimed to study the month wise population of sarus crane during the year 2014 in and around the Alwara Lake of district Kaushambi (Uttar Pradesh) India and their comparison to month wise sarus crane population recorded in 2012 and 2013 in the same study area.

2. Study area

The Alwara Lake (Image 1) is a natural lake (Fig. 1) and a part of perennial wetland. Itis surrounded by agricultural fields and connected to the river Yamuna and covers more than 1750 hectares. It is located in Sarsawan block of Manjhanpur tahsil of Kaushambi district of Uttar Pradesh. This lake is surrounded by Ranipur, Dundi, Hatwa and Bhawansuri in east,Paur Kashi Rampur, Alwara and Gaura in the north, Shahpur, Umrawan in the south and Mawai, Tikra and Dalelaganjin the west.

The lake is more than 75 km away from Allahabad, 25 km from Manjhanpur (headquarter of district Kaushambi) and 290 km from Lucknow by road. Its nearest railway station is Bharwari at a distance of 35 km and nearest airport Bamrauli (Allahabad) is at a distance of 70 km. It is situated between the latitude $25^0$24'05.84"S – $25^0$25'10.63"N and longitude $81^0$11'39.49"E-$81^0$12'57.95"W with altitude MSL – 81.08 meter.

3. Material and method

The authors used binocular, camera, motorbike, chappu boat, field stick etc. for various purposes. The findings are based upon the work conducted in all the 12 months in 2014. Investigations were conducted during first and third Sunday of every month and investigation time was from 8 am to 6 pm. All the observations were made while moving through the chappu boat and walking along the croplands, mud lands, natural areas using binoculars (7x35 and 8x40-BEZIF BM-9) and canon cameras. Sights and calls were the devices to enlist a bird at a particular site.

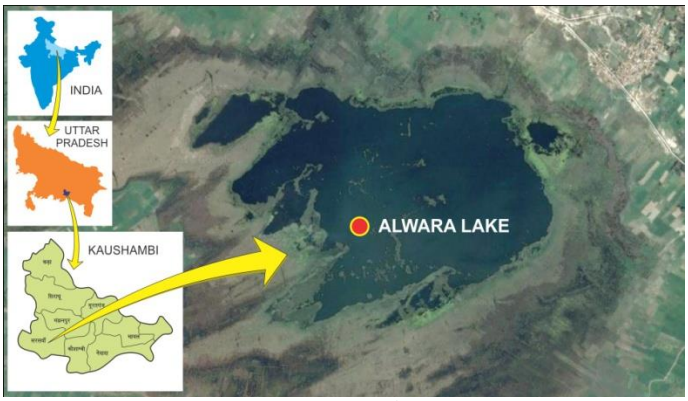

Image 1: Study Area in Kaushambi District of Uttar Pradesh (India).

Fig. 1: A View of Alwara Lake of Kaushambi District of U.P. (India).

Identification of different species was aided by using standard guides such as Ali (1941), Wild Life Institute of India wetland research methodology (1999) and Aryal *et al,* (2009). Since sarus crane is a huge bird and visible from a distance hence sarus count was almost accurate. Besides actual sightings, inquiries from local people were also made to ensure the estimate of existing population and their perceptions about the existence of the crane. Census was avoided during rainy days as possible. Population comparison was determined as a single, pair, pair with one juvenile, pair with two juveniles and flocks comprising adults and juveniles.

4. Result and discussion

Sarus crane is a social, omnivorous, monogamous bird and well known as an eternal symbol of unconditional love, devotion and good fortune.These are seen mostly in pair (Fig. 2, 3 and 4) rarely in solo condition (Fig. 5) or in pairs with juvenile or in congregation (Fig. 6). The family group occurs in whole year but during non-breeding season, cranes are seen in congregation for mate finding or pair formation. Male attracts the female to display very unique type of dance. These are involved in social displays to facilitate the pairing of unmated birds and to establish a pecking order among families.

Fig. 2: Paired Sarus Crane in Agro-Field around Alwara Lake.

Fig. 3: Sarus Crane Pair: Caring for each other

Fig. 4: Sarus Crane Pair in Feeding Mode in Paddy Field

Fig. 5: Sarus Crane in Single in Paddy Field around Alwara Lake.

Fig.6: Sarus Crane in Congregation in Study Area of Alwara Lake.

Prakash *et al*, (2014) counted the population of sarus cranes month wise from January 2012 to December 2012 (Table) in three different transects of Alwara Lake and argued that from ecological point of view this site is very favourable for sarus crane distribution. They reported 335 cranes in total in and around Alwara Lake in 2012. In the same manner, Verma *et al*, (2016a) counted the population of sarus cranes month wise from January 2013 to December 2013 (Table) and reported 425 cranes in total in and around Alwara Lake. In present population dynamics, authors collected a data of 510 cranes in the same study area during the period of 12 months in 2014, as shown in table and bar diagram (Image 2).

Table: Month Wise Comparison of Sarus Crane Population from 2012 To 2014

Month	No. of cranes in 2012	No. of cranes in 2013	No. of cranes in 2014
Jan.	36	41	48
Feb.	33	38	44
Mar.	29	39	45
Apr.	22	30	34
May	09	25	36
Jun.	12	20	28
Jul.	27	38	47
Aug.	24	35	46
Sep.	34	41	47
Oct.	38	43	48
Nov.	35	38	43
Dec.	36	37	44
Total	**335**	**425**	**510**

Above representation clearly indicates the increasing trends of sarus population growth from 2012 to 2014. The reason behind the increase in population is due to openness, suitable agricultural land and seasonal marshes dominated over the climatic factors and occurrence of favourable ecological, feeding, mating and nesting conditions as well.

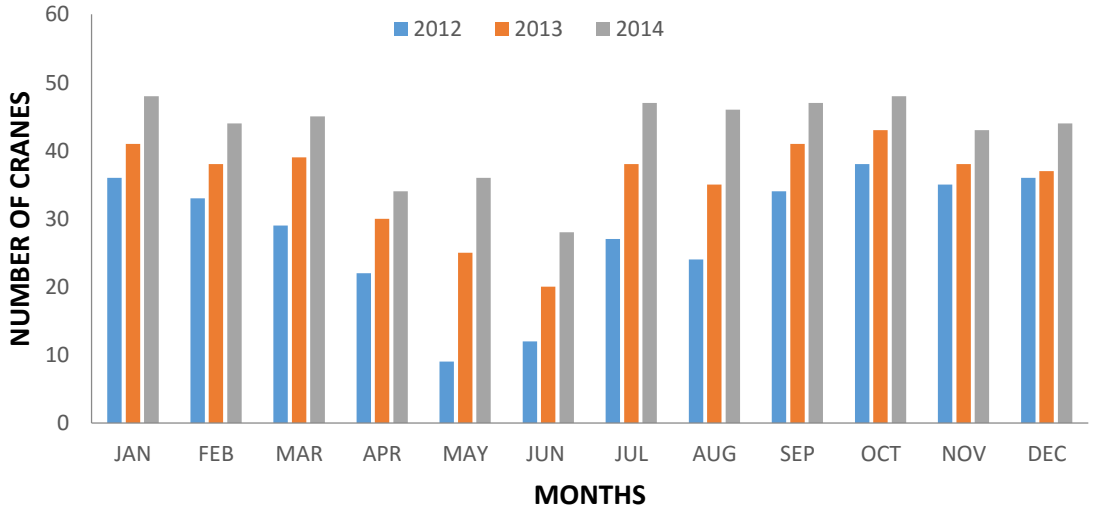

Image 2: Graphic Representation of Month wise Population of Sarus Cranes from 2012 to 2014.

The said lake is although influenced by various climatic and anthropogenic hazards including pollution, habitat degradation, predation etc. yet it has huge fish bio-diversity too (Prakash *et al*, 2015d and Verma 2016h), which is maintained by river Yamuna. No doubt, the ecological climate and weather of this lake is also supporting the survival of certain other endangered and vulnerable species like many plant species, several fishes and Indian sarus crane (Verma A.K. and Prakash S. 2016f).

5. Conclusion

Globally the sarus cranes are at the verge of extinction due to widespread reductions in the extent and quality of their wetland habitats, exploitation and the effects of pollutants, unplanned farming, irrigation and non-adoption of wild life rules and regulations as well. The increased anthropogenic activities, changed use of land and degradation of wetlands for agricultural expansion as well as for industrial development are the most serious threats to the cranes (Gole P., 1989). As a consequence, the species has suffered a rapid population decline within a few decades. Due to its declining number, Indian sarus crane has been now listed as globally threatened i.e. vulnerable avian species (Bird Life International, 2012).

However, in the present study, an increasing trend is clearly indicated in the table and bar diagram. This increasing trend in the population of sarus crane means declining population of sarus crane is increasing gradually, which is an important aspect for ecological balance. Prakash *et al*, (2014) and Verma *et al*, (2015, 2016a) strongly argued that this is happening only because of favourable environmental conditions for sarus crane in and around the Alwara lake and the Alwara lake is good natural habitat for this species (Verma *et al*, 2016g).

The authors recommend continuous population census of this species at regular intervals in whole area of Kaushambi district. The authors also recommend the Ministry of Environment & Forests, Government of India and Uttar Pradesh for the declaration of the entire Alwara lake region as a "Sarus Safe Zone" for the conservation of sarus crane with regular monitoring. Measures should be taken to minimize the huge exploitation of natural resources of the Alwara lake as well. Awareness programme among adjoining villagers should also be conducted frequently at regular intervals in order to save, conserve and protect this valuable vulnerable bird.

Simultaneously, systematic and well planned detailed survey of this lake is also recommended for biodiversity and conservation point of view. In planning and implementation, contribution of local people should also be taken as their biological and socio-economic needs are associated with this lake.

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