



STATUS OF SARUS CRANE (*GRUS ANTIGONE*, LINN.) IN MADHYA PRADESH, INDIA

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ABSTRACT

The Sarus Crane (*Grus Antigone*, Linn.) is considered Vulnerable at the international level by IUCN but has been included in Schedule IV of Indian Wildlife Protection Act, 1972 amended till date. One of the largest and the most dominant species in India, which has been declared as the State Bird of Madhya Pradesh, logically deserve serious studies on its current status.

In the present study, special focus was given to the preferred habitats i.e., large agricultural farmland and wetland areas, which are distributed in 26 districts of the state. In addition 07 more districts were also surveyed in two years period. During the survey, direct sightings along with geo-references have been recorded and photographed. Additional information were collected by interacting with the local community and meticulously recorded. A total of 347 individual birds were recorded through direct sighting during the project period and if one adds the reports from the local community, the total number of birds now stands at 491 birds. But one has to remember the limitation of this methodology, which does not exclude the possibility of repeat sighting of the same bird at a different location. As such, to exclude such possibilities, same day census operation at all the selected locations, by deploying large number of ground staff, could be undertaken in future.

Besides incorporating the data on the locations and sightings, suitable recommendations have been made towards its conservation action, especially focusing on the need for extensive Public Awareness Programme through appropriate visual display. It has also been pointed out that land use changes, both in case of large agricultural land and water-spread areas should be appropriately controlled as a part of State Policy for conserving the State Bird of Madhya Pradesh.

INTRODUCTION

The Sarus Crane is classified as Vulnerable (VU) on the IUCN Red List 2013. It has been listed in Appendix II of CITES (April, 2003) and Appendix II of the Convention on Migratory Species (CMS or Bonn Convention) (CMS April, 2003). However this bird species has been placed in the Schedule IV of Wildlife (Protection Amendment) Act, 2002 of the Government of India. This species has suffered rapid population decline in the last few decades (Rajgir and Khalique, 2012).

They forage on natural marshes and shallow

wetlands for roots, tubers, corms of aquatic plants, grass shoots as well as seeds and grains from cultivated crops such as groundnuts and also frequent wet cereal crops like rice and wheat (Johnsgard, 1983; Sundar, *et al* 2000; Sundar and Choudhury, 2003; Sundar and Choudhury, 2006).

Sarus Cranes are known to be less vegetarian than other cranes and largely considered a fish-eater depending on availability of fishes; they also forage on crustaceans, frogs, lizards, locusts, grasshoppers and other large insects (Ali and Ripley, 1969). Sarus Cranes can also occasionally cause considerable damage to newly sown crops.

Sarus Cranes preferentially use wetlands (Sundar, 2009) or uncultivated patches amid flooded rice paddies (locally called *khet-taavadi*, Borad *et al.*, 2001) for nesting because of the deterioration and destruction of its natural wetland habitat (Meine and Archibald 1996, Sundar 2009). Sunder had commented that “*the Sarus used to inhabit a large swathe of the subcontinent until just about a hundred years ago. Today, however, it’s been hunted out of Bihar, and driven out of Madhya Pradesh due to inhospitable modes of farming*” (The Hindu, March 17, 2013).

The global population of sarus crane in the world was estimated as 15,000-20,000 in 2009 by the Bird Life International. But the latest data (2012) from the same organisation indicates the total number is between 13,000-15,000, shows a sharp decline in population within its area of distribution. India as one of the major habitat of Sarus Crane has also witnessed dwindling population of these magnificent birds during last 5 decades. Ali and Ripley, (1969) stated that it is a resident species “moving locally with condition of drought and flood, throughout the northern parts of the subcontinent south of the Himalayas (including Nepal terai), from Sind and Punjab eastward through Uttar Pradesh, Bihar and northern Bengal (duars) to W. Assam. Earlier record of these birds from Kashmir in 1907 has also been sighted by Ali and Ripley (*op.cit*) which was perhaps where these birds were sighted. Now, most of the citing records and observation are from only 3-4 states viz. Madhya Pradesh, Uttar Pradesh, Rajasthan and Gujrat.

Kaur *et al.* (2010) estimated Indian population of sarus crane as less than 10,000 and in today’s world out of 3 sub species of these birds India can boast of a healthiest population. It may be pointed out that in adjacent country of Pakistan it has not been seen since 1980’s. Finally it may be worthwhile to mention that a estimated global population of sarus crane in 2000 A.D was considered at best 10%, and at worst 2.5%, of the number that existed in 1850; it shows that the population of sarus crane has declined by 90% over a period of 150years. (BirdLife International (2016) Species factsheet: *Antigone antigone*. <http://www.birdlife.org>; <http://www.birdlife.org>)

Owing to inadequate data on the Status of Sarus Crane in Madhya Pradesh, an intensive survey to understand the seasonal pattern, preferred locations, population size and major threats to its survival was undertaken during 2013–2015, supported by the Madhya Pradesh Biodiversity Board and the results of the study are given below.

METHODOLOGY

Site Selection

Survey areas were chosen primarily using **reported historical distribution** of Sarus Crane. Additional list of sites based on known **habitat parameters** (wetlands & large agricultural fields) was collated (vide - Map).

The Sarus Crane is known to occur in sites with **shallow water bodies** (river banks, water canals, banks of water reservoirs, ponds, marshy lands, agricultural lands etc.), and occasionally in grassland or around human settlements.

A total of 40 locations were chosen based on occurrence of PA or wetlands falling into 20 districts. Additionally large agricultural fields (>50,000ha) in 6 districts were included.

Based on the above criteria, it was designed to cover **26 districts across the State** (Fig. 1). **Seven** more districts were added in the course of survey.

Structured informal interview was conducted at each site to reaffirm the presence/absence and abundance of Sarus in the village proximity.

Additionally, flashcard with Sarus Crane was used while interviewing the local people on the occurrence of the bird and to get a perception of threat.

Photographic evidence of the direct sighting was recorded (Annexure I).

For every site surveyed, geo-coordinates and habitat parameters were recorded irrespective of the direct sighting.

Survey Design

The present project was aimed at gross estimation of Sarus Crane population in the State of Madhya Pradesh, India.

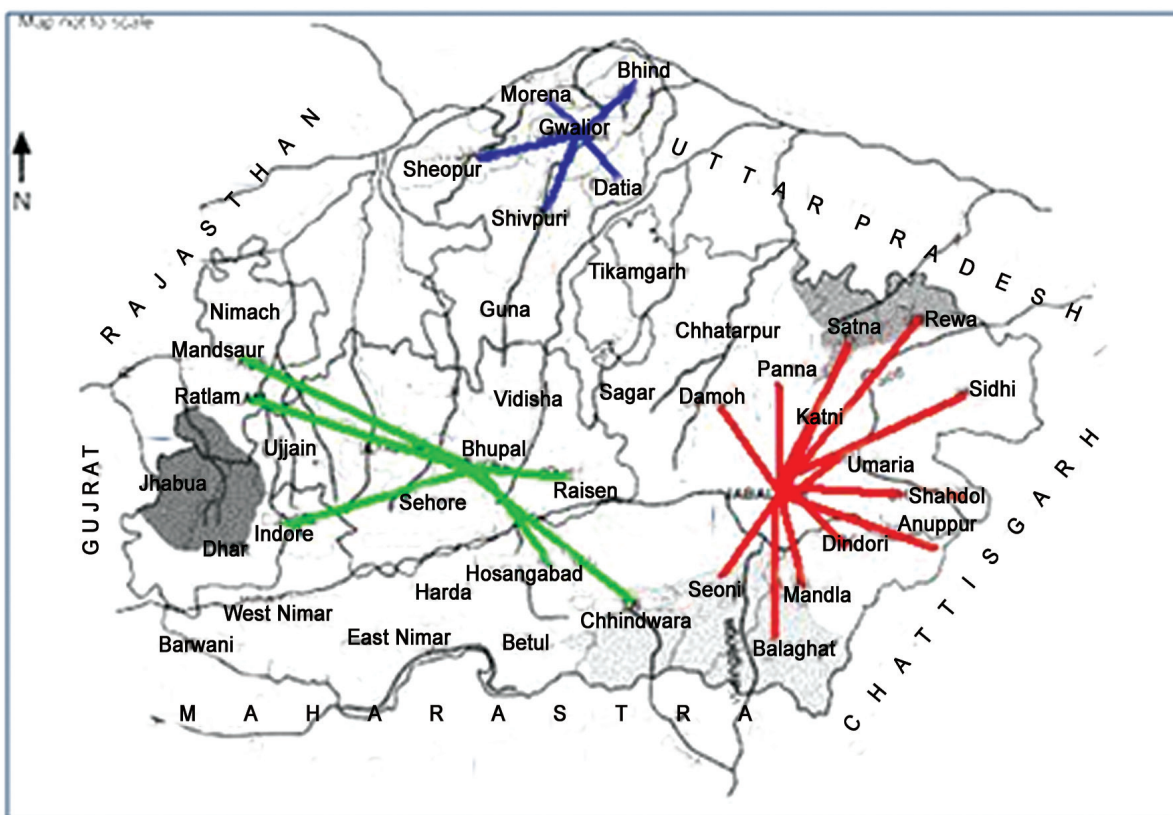


Fig. 1. Map of study area in Madhya Pradesh

Considering that the bird population may vary seasonally in non-breeding seasons (pre-monsoon and post-monsoon), the survey work was aimed at three principal and potential seasons, namely :

Pre-monsoon (March-June), 2014 and 2015

Monsoon (July- October), 2013 and 2014

Post-monsoon (November-February), 2013 and 2015

Site visits were done at least once to every site in each season across two years.

The survey relied primarily on direct sighting of the species by any of the team members. Secondary data was gathered through informal interviews of the locals.

RESULTS

During, all the targeted spots in 33 districts were visited, six times all together to study Sarus Cranes in their habitats (Fig. 2). Eastern districts- Satna, Rewa, Sidhi, Shadol, Dindori appeared to be devoid of this birds since none were seen in two years. Very scanty report is there from these districts which did not convince us so far as Sarus

Crane's presence was concerned. Owing to lack of direct sighting in all the six visits we came to the above conclusion.

The Western as well as North-Western districts, sharing the boundaries with Rajasthan and Uttar Pradesh, – Ratlam, Mandsaur and Nimach appeared to have more potential habitats of large agriculture field and wetlands as Sarus Cranes were seen there in almost all the visits.

The Northern districts, namely Morena, Bhind and Datia share boundary with Uttar Pradesh and having exact preferred habitats harbour considerable number of Sarus Cranes.

Some of its suitable habitats in the centrally located districts like Damoh, Jabalpur, Hosangabad, Raisen, Bhopal and Indore give refuge to several Sarus Cranes.

Balaghat is the only district in the South-Eastern part of Madhya Pradesh where Sarus Cranes were encountered anytime of the year.

On the basis of research findings, a list of suggested areas for conservation of the species has been prepared and given below (Table 1)

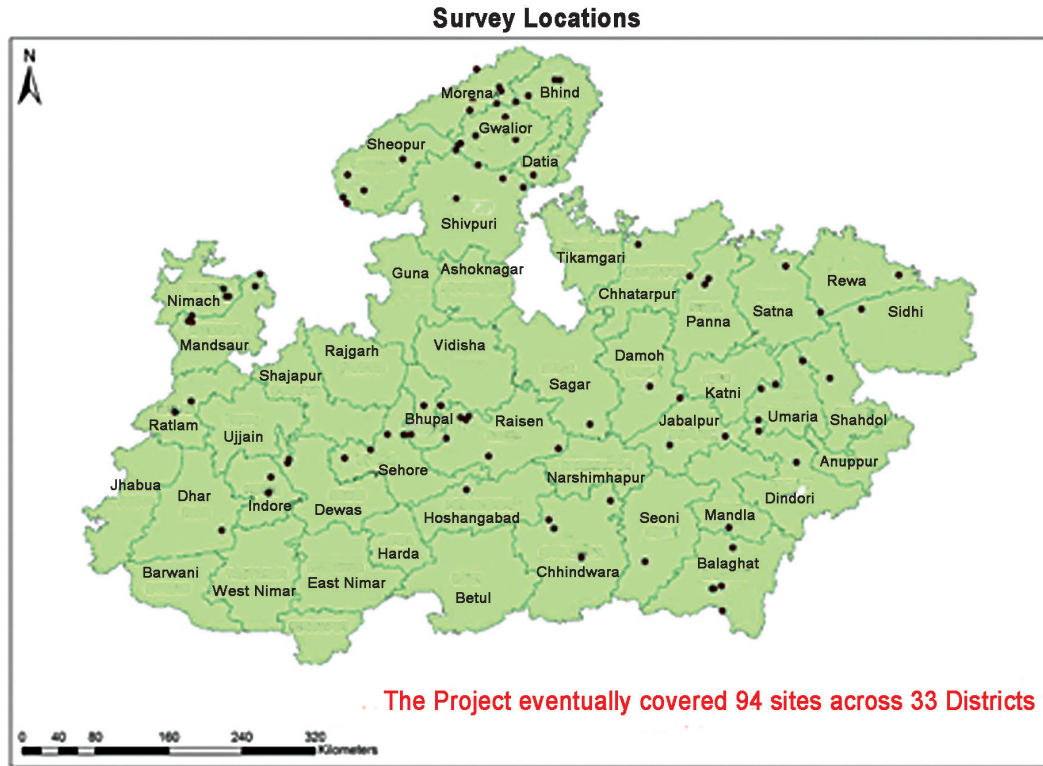


Fig. 2. Sites Visited during Survey

Table 1. Sarus Cranes Seen and Reported by Locals in the Districts of Madhya Pradesh: (Priority areas suggested for Sarus Crane conservation based on current Research finding)

Sl. No.	Region in Madhya Pradesh	Districts	No. of Sarus Directly Seen	No. of Sarus Reported	Geo-references
1	Central	Damoh	36	07	23° 41.014' N: 079° 36.379' E
		Raisen	38	15	23° 24.267' N: 077° 49.677' E
		Hosangabad	11	04	22° 42.801' N: 077° 48.289' E
		Bhopal	26	24	23° 13.950' N: 077° 15.744' E
		Indore	47	20	22° 57.844' N: 076° 02.875' E
2	Eastern	Satna	00	None	24° 48.603' N: 080° 56.462' E
		Rewa	00	2	24° 22.658' N: 081° 16.992' E
		Sidhi	00	None	24° 24.417' N: 081° 41.072' E
		Shadol	00	None	-----
		Dindori	00	1-2	22° 58.139' N: 081° 02.763' E
3	South-Eastern	Balaghat	51	19	21° 47.126' N: 080° 13.150' E
		Mandla	13	3	22° 21.476' N: 080° 22.955' E
4	Northern	Morena	08	16	26° 39.483' N: 077° 54.273' E
		Bhind	19	30	26° 24.585' N: 078° 24.720' E
		Datia	18	18	25° 39.968' N: 078° 27.649' E
5	North-Western	Sheopur	02	04	25° 24.049' N: 076° 37.799' E
		Shivpuri	05	04	25° 37.989' N: 078° 09.743' E
6	Western	Ratlam	21	02	23° 32.536' N: 074° 66.041' E
		Mandsaur	41	17	24° 16.869' N: 075° 06.598' E
		Nimach	31	22	24° 35.705' N: 075° 25.250' E

ANNEXURE I



A Sarus Crane soars over Chandna Talao, Raisen district in Monsoon, 2013

Sarus Crane adult and juvenile at Daili, Mandsaur district, in Winter, 2013



Sarus Crane pair at Nayetra, Balaghat district in Summer, 2014

Sarus Cranes at Ramsagar Dam, Bhind district in Monsoon 2014





Nesting pair at Nimsarya, Hosangabad district in Monsoon, 2014

Sarus Crane pair at Nayetra, Balaghat district in Winter, 2014



Sarus Crane pair at Nar Talao, Ratlam district in Winter, 2014

Pair of Sarus Crane at Dhanga, Mandsaur district in Summer, 2015



Out of the 33 districts only 17 districts yielded convincing results and visiting these districts (Table-1) one would be able to locate Sarus Cranes *in situ*. Therefore, special attention is needed to conserve, at least these wetlands, if not the private agricultural lands. Since Sarus Cranes prefer wet cultivated lands, and conversion of agriculture from wet rice paddies to dry soy bean or sugar cane, if possible, should be prevented. The role of rice paddies may be particularly important for the bird's conservation, since natural wetlands are increasingly threatened by human activity (Sunder, 2009).

Breeding pairs are territorial, considered symbols of marital fidelity, believed to mate for life and pine the loss of their mates even to the point of starving to death. Like other cranes, they form long-lasting pair-bonds and maintain territories that are defended from other cranes using a large repertoire of calls and courtship displays which include loud trumpeting, leaps and dance-like movements. The breeding grounds in Phanda Farm (Bhopal), Nimsarya (Hosangabad), Nar Talao (Ratlam), Harsol and Daili (Mandsaur), Besla as well as Bhimpura (Nimach), Hridenagar Asrar (Mandla) and Udgava (Datia) are already protected by the local people. But there are places which, if protected, would allow Sarus Crane to breed and rear the brood without disturbances and these places are Yashbantsagar Dam in Indore, Dehaila water body in Shivpuri, several wetlands in Bhind and Audha Dam in Sheopur. In Chandna Talao and Mahu Village Dam near Saleragaon in Raisen, Sarus Cranes were seen to inhabit apparently peacefully since the Chandna Talao and the Dam are situated at a very remote place, but it is awfully disturbed by local people for fishing and the species gets disturb from *singhara* plucking in monsoon which is the breeding season of the bird as well. Therefore, these water bodies should be taken care of to let the Sarus Cranes breed successfully.

Non-breeding birds occur as flocks of various sizes that vary from 1–430 birds (Sunder and Choudhury, 2003; Livesey, 1937; Prasad *et al.*, 1993). Ali & Ripley (1969) reported loose congregation of 60 – 70 or more (once *c* 150)

adults and adolescent young Sarus Cranes in late winter as a mark of social 'gathering of the clan'. Such flocks of various sizes we observed in Yasbantsagar Dam (Indore), Sind River side (Datia), Garaghat Fishery Tank (Damoh) and Itkhery Chhap (Bhopal). The rainy season is the main breeding season when the pair builds an enormous nest "island", a circular platform of reeds and grasses nearly two meters in diameter and high enough to stay above the shallow water surrounding it. Such nests were seen and photographed in Udgava (Datia), Phanda Farm (Bhopal) and in Nimsarya (Hosangabad) during August, 2014.

Breeding success has been estimated at about 20% (Borad, *et al.*, 2002). In areas where farmers are tolerant, as mentioned above, the birds nest in flooded rice fields, and also select those wetlands which are likely to have similar rates of survival.

Sarus Cranes seem to prefer wetlands most (61%) and then the agricultural fields (24%) and these habitats need to be protected (Fig. 3).

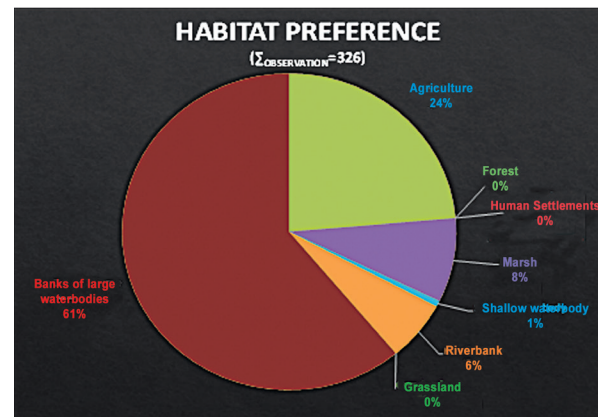


Fig. 3. Preferred Habitats of Sarus Cranes

If all the sites mentioned above are suitably protected, the Sarus Crane population would get a chance to come back to their breeding-cum-foraging grounds.

This has been shown in the above 'Detection Probability Map', (fig. 4) i.e. Interpolation using "Inverse Distance Weight (IDW)" which is a prediction methodology to estimate certain unknown values based on known values having same parameters. Here the distribution probability of Sarus Cranes in "a not visited" sites is predicted

based on recorded sightings of the bird in “visited locations” but not the population estimate across the state. Thus in the map, dark color indicates higher occurrence probability (but not the number of Sarus Cranes) that may be present in that area. This interpolation model estimates the value of an attribute {detection probability in this case} at un-sampled points using linear combination of values at sampled points weighted by an inverse function of the distance from the point of interest to the sampled points {visited sites}. The IDW map uses only Latitude, Longitude and Frequency (which is the maximum number of Sarus Crane individuals observed for every site over all survey seasons, i.e. the weight for IDW)

The above Interpolation (Fig. 4) is at par with the current observation of Sarus Cranes across the State of Madhya Pradesh. The dark colored areas, if protected, the Sarus Crane’s major habitat would in turn help successful survival of this bird species in Madhya Pradesh.

INFERENCES

The findings of these surveys indicate that

number of the Sarus Crane sighted was less inside the protected areas than outside

They showed definite territorialism, at least during breeding season

Total number of Sarus Crane observed during the two years in the targeted 26 districts with additional 7 districts, now stands at 347 individuals.

Total number of Sarus Crane reported authentically by local people during the period of survey totals at 313 individuals.

THREATS

The main threats are a combination of loss and degradation of wetlands, as a result of draining and conversion for agriculture (for e.g., wet rice paddies into dry sugarcane or soy bean).

Ingestion of pesticides, hunting of adults, collection of eggs and chicks for trade, food, medicinal purposes etc. and in some areas, drive out the bird to help prevent damage to the standing crops which affect the Sarus Crane population.

Rampant human usage of wetlands mainly for fishery and *singhara* (*Trapa natans* = *T. bispinosa*) cultivation results in considerable

Detection Probability of Sarus

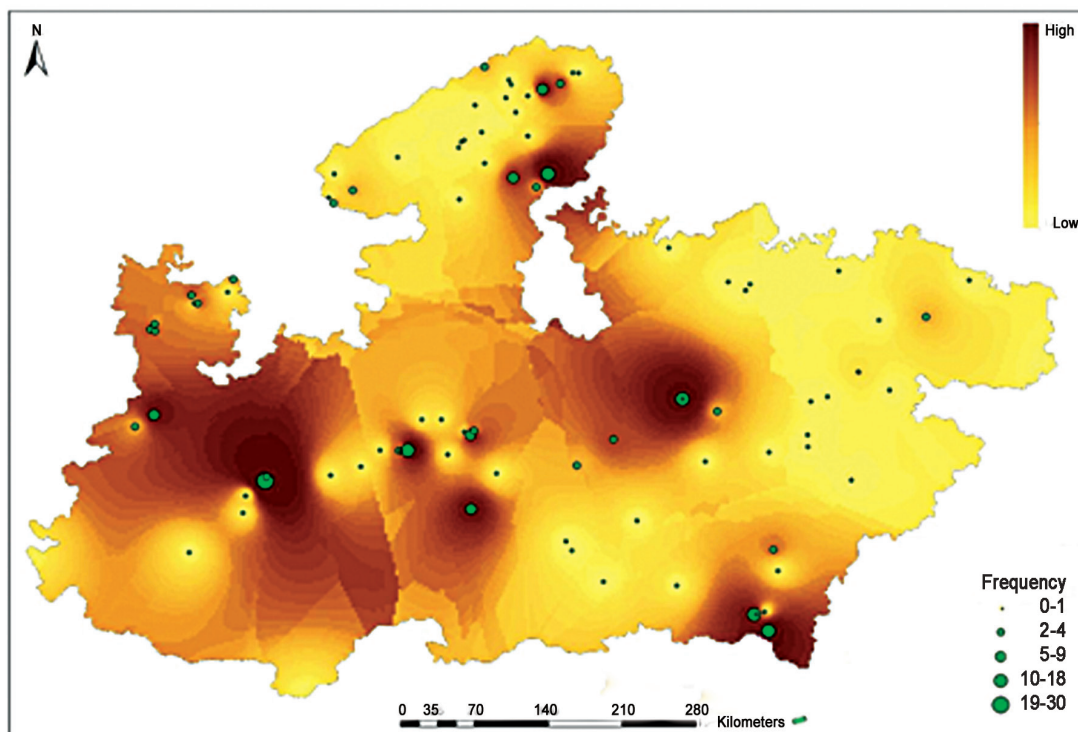


Fig. 4. Probability of Occurrence of Sarus Crane in the Study Areas

disturbance to Sarus Cranes which adversely limits its breeding.

High human usage of wetlands results in a high rate of disturbance to the crane and considerably limits breeding success (Sundar and Choudhury, 2003).

Adults have been known to fly into power lines and die of electrocution, which is responsible for killing about 1% of the local population each year. Collision with power lines may be a significant threat in parts of its range, with observations from India suggesting that 2.5-20 % of cranes are affected.

All these threats reflect increasing anthropogenic pressure.

SURVEY LIMITATION

The major limitation of the present survey was the inability of two survey team members to cover all the sites in every season on selected dates

Overlapping figures would have been excluded involving nearly 188 people at a time for 94 sites (Fig. 1) spreading over 33 districts of MP which was beyond the scope of the present budget surveyor

FOREST PERSONNEL VIS-À-VIS LOCAL PEOPLE

Information network needs to be established between public and local Wildlife Wing of the Forest Department who has to be proactive to save the bird;

Reward-based system for Informer of poaching could be introduced;

Non-responsiveness of forest department in time of Sarus Crane injury disappointed common people.

CONCLUSIONS

Awareness programme needs to be spread to conserve Sarus Crane through public hoarding and media advertisement with the photograph of this unique bird.

Bird's habitats should be restored;

Wetlands should be kept free of disturbance and, if possible, people should be discourage to

use those wetlands where Sarus Cranes forage, roost, rest and nest;

Hunting of the bird has to be prevented and it should be ensured that following nesting, their eggs are not taken away by street/village urchins;

Agriculturists could be persuaded to give them space in their fields;

Destruction of wetlands owing to agricultural expansion, however, is becoming rampant and poses a significant threat as well;

The mechanisation of farming practices may threaten birds breeding on agricultural land (Sundar *et al.*. 2000).

The future of the Indian Sarus Crane is closely tied to the quality of small wetlands are exposed to improper use, such as, high rates of sewage inflow, extensive agricultural runoff with high levels of pesticide residues, and intensification of agricultural systems. This needs to be monitored.

Periodic monitoring of the habitats and census of the bird should be carried out.

Restoration of existing habitats of Sarus Cranes as well as awareness campaign for its conservation is essential to revive the Sarus Crane population in Balaghat, Hosangabad, Hridenagar, Baratalao of Bhopal, Phanda Farm, Ratlam, Harsol, Besla, Bhimpura, Daili, Dhanga, Dehaila, Sind River Side, Udgava, Audha Dam, Ramsagar Dam, Chandna Talao, Mahu Village Dam in Madhya Pradesh

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ANNEXURE II : Sarus Cranes sighted and photographed

Site ID / District	Site Name	GPS location		Survey 1 Monsoon (Jun-Sep)	Survey 2 Winter (Nov-Feb)	Survey 3 Summer (Mar-May)	Survey 4 Monsoon (Jun-Sep)	Survey 5 Winter (Nov-Feb)	Survey 6 Summer (Mar-May)	Habitat
		Lat	Long							
Balaghat- 1	Nayetra	21° 47.126' N	080° 13.150' E	0	3	12	6	7	2	Agriculture
2	Garda Talao, Balaghat	21° 48.549' N	080° 18.427' E	0	0	0	0	0	0	Water Body
3	Katangi Talao	21° 29.754' N	080° 18.319' E	0	0	12	4	2	3	Marshy
Bhind- 1	Itehar	26° 33.517' N	078° 40.370' E	0	0	0	0	0	0	Pond
2	Pur	26° 33.344' N	078° 43.308' E	0	0	0	0	0	0	Pond
3	Barhad	26° 27.671' N	078° 33.84' E	0	4	0	0	2	2	Agriculture
4	Rajghat	26° 39.483' N	077° 54.273' E	0	2	0	0	4	0	Riverside
5	Ramsagar Dam	26° 24.585' N	078° 24.720' E	0	0	2	7	0	0	Water Body
Bhopal- 1	Bhoj Wetland	23° 13.950' N	077° 15.744' E	0	0	0	13	0	0	Water Body
2	Halali Reservoir	23° 30.221' N	077° 33.129' E	0	0	0	0	0	0	Water Body
3	Phanda Farm	23° 13.677' N	077° 11.372' E	0	3	0	4	4	2	Agri. & WB
Chhindwara-1	Pench TR	21° 47.099' N	080° 14.199' E	0	0	0	0	0	0	Forest
2	Chhindwara Tehsil	22° 04.468' N	078° 56.017' E	0	0	0	0	0	0	Builtup
3	Delakheri	22° 25.807' N	078° 36.823' E	0	0	0	0	0	0	Agriculture
4	Harrai, Ataria Village	22° 36.665' N	079° 13.127' E	0	0	0	0	0	0	Agriculture
5	Tamia	22° 20.966' N	078° 39.861' E	0	0	0	0	0	0	Agriculture
Chatarpur	Khajuraho - Benisagar dam	25° 00.820' N	079° 29.494' E	0	0	0	0	0	0	Water Body
Damoh	Garaghat Fishery Tank	23° 41.014' N	079° 36.379' E	0	12	0	0	18	4	Agri. & WB
Datia- 1	Udgava Wetlands	25° 32.981' N	078° 21.710' E	0	0	0	2	2	0	Agri. & WB
2	Sind River Valley	25° 39.968' N	078° 27.649' E	0	0	0	0	0	12	River-side
3	District Datia-near Bina Rly Stn	23° 13.658' N	077° 12.029' E	2	0	0	0	0	0	Agriculture
Dewas	Kalukheri, Amlabati Village	22° 59.983' N	076° 03.574' E	1	2	0	0	0	0	Water Body

Annexure II contd.

Site ID / District	Site Name	GPS location		Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6	Habitat
		Lat	Long	Monsoon (Jun-Sep) Aug-13	Winter (Nov-Feb) Dec-13	Summer (Mar-May) Apr-14	Monsoon (Jun-Sep) Aug-14	Winter (Nov-Feb) Dec-14	Summer (Mar-May) Mar-15	
Katni- 1	Khanr	23° 34.375' N	079° 54.147' E	0	0	0	0	0	2	Agriculture
2	Khitouli Gate, Barhi, Katni	23° 42.223' N	080° 50.567' E	0	0	0	0	0	0	Agri. & WB
Mandla- 1	Kanha NP	22° 10.228' N	080° 25.275' E	0	0	0	0	0	0	Forest
2	Hridenagar, Padmi	22° 21.476' N	080° 22.955' E	0	2	0	3	3	3	Agri. & Marshy
Mandsaur- 1	Wetlands -	24° 31.594' N	075° 26.476' E	0	0	0	0	0	0	Agri. & WB
2	Harsol	24° 16.869' N	075° 06.598' E	0	3	0	0	3	0	Water Body
3	Soumya Dam	24° 17.699' N	075° 04.189' E	0	4	0	3	2	0	Agri. & WB
4	Ritam River Side	24° 20.580' N	075° 06.327' E	0	0	0	2	0	0	River bank Agri.
5	Nauli Village, Gandhisagar	24° 37.392' N	075° 43.737' E	0	0	0	0	0	0	Agri. & WB
6	Dhanga Talao	24° 44.172' N	075° 46.544' E	0	0	0	0	0	2	Pond
Morena- 1	Kotowar Dam (Asan River)	26° 29.496' N	078° 07.608' E	0	0	0	0	0	0	Water Body
2	Piluwa	26° 27.162' N	078° 08.726' E	0	0	0	0	0	0	Water Body
3	Pagara	26° 16.340' N	077° 50.277' E	0	0	0	0	0	0	Agri. & WB
4	Rajghat	26° 39.483' N	077° 54.273' E	0	2	0	0	3	3	River-side
5	Bamour Gaon, Morena	26° 20.242' N	078° 06.074' E	0	0	0	0	0	0	Agriculture
Nimach- 1	Bhimpura Talab, Manasa	23° 19.622' N	079° 01.082' E	0	4	0	2	2	0	Water Body
2	Besla	24° 31.577' N	075° 28.319' E	0	3	0	2	4	4	Agri. & WB
3	Dailee	24° 35.705' N	075° 25.250' E	0	4	0	2	2	2	Agri. & WB

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