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RAPID SURVEY OF INDIAN SARUS CRANE (*GRUS ANTIGONE*) IN UTTAR PRADESH

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INTRODUCTION

The Crane Family, Gruidae, comprises 15 apecies of large, graceful birds distributed across five continents. There are four recognized subspecies of Sarus Cranes, Indian (*G. a. antigone*), eastern (*G. a. sharpie*), Australian (*G. a. gillae*) and extinct Philippine Sarus (*G. a. aluzonica*; Blanford, 1896, Schodde *et al.*, 1988, Meine & Archibald, 1996). Unfortunately, cranes are threatened worldwide due to habitat loss, excessive harvest and disturbance (Meine & Archibald, 1996) making *Gruidae* one of the most threatened groups of birds in the world. Within crane family, 10 species are considered to be globally threatened (Hilton-Taylor & Mittermeier 2000).

The Sarus Crane *Grus antigone* (Linnaeus, 1758) is the tallest flying bird in the world, has a broad distributional range that spans two continents. Sarus is the only species of crane that breeds both in India and Southeast Asia (Meine & Archibald, 1996) and considered to be globally threatened (Sundar 2005). The ranges of Indian and eastern Sarus converge in eastern India and Myanmar (Johnsgard 1983), whereas the Australian Sarus exists only in Australia (Schodde *et al*, 1988). The more sedentary Indian Sarus exists in many of several thousand birds, it is the least threatened of the Sarus populations (Meine & Archibald 1996, Sundar & Kaur, 2000). In India, the Indian Sarus Crane *Grus antigone antigone* is distributed from Jammu in the north to Chandrapur in Maharashtra in the South, and from Gujarat in the west to Assam in the east (Choudhury 1998, Choudhury, 2002, Choudhury *et al.*, 1999, Sundar, 1999, Sundar & Kaur 2000, Sundar *et al.*, 2000a,b, Kaur *et al.*, 2002). Anecdotal information provides adequate evidence of the disappearance or reduction of crane numbers considerably from vast areas of its past distribution. The Sarus seems to have been disappeared as a common bird in West Bengal and its population remains unknown (Choudhury, 1998, Sundar *et al.*, 2000a, Sundar & Choudhury, 2003). Earlier also, Sarus was present in low numbers in Jalpaiguri, Barrackpore and Manbhum (Beavan, 1868) of West Bengal and in the open valleys of Sarguja (Inglis 1908). Whereas, a pair was reportedly seen in Cooch Behar of West Bengal by Sundar *et al.*, (2000b) and yet another pair was sighted recently in a coal pit near Asansol, West Bengal (Statesman Daily, 3rd March, 2007, Kolkata Edition).

Besides India, Nepal is the only country where considerable number of Sarus Cranes had been recorded. They are present in small numbers and highly localized by restricting themselves to few locations in the districts of Rupandehi and Kapilvastu with a total population of <150 individuals (Suwal & Shrestha 1992, Shrestha 1999). The Indian Sarus Crane has a continuous distribution that does not vary seasonally (Sundar *et al.*, 2000a, Sundar & Choudhury 2003). The only discontinuity in the distribution range occurs in West Bengal and Assam where the Sarus are believed to migrate in winter, but the source of this population remains unknown (Choudhury, 1998).

The Sarus Crane (1.5 m tall, approx) is the tallest flying bird in the world. Though the Sarus Crane has a wide distribution in India, the present stronghold of the species is considered to be Uttar Pradesh. Watered by several rivers, the rich alluvial plains of the State offer suitable habitats for the waterbirds in general and

Sarus in particular. In districts of Etawah and Mainpuri, the cranes are found in high densities co-existing with the farmers and often breeding successfully every year. These two districts have high density of Sarus not only in India but also worldwide. Of the estimated 8000-10000 birds in India, 2500-3000 can be found in these two districts alone (Sundar, 2001).

Although human populations are high in many areas of the former range of the Sarus, the cranes and other wildlife that could adapt to human altered environment, flourished. Hence, we decided to conduct quick and rapid surveys to enumerate the present population of Sarus Crane in Uttar Pradesh mainly in Etawah and Mainpuri.

Study Area :

In Uttar Pradesh, surveys were carried out in the following districts viz., Aligarh (Fig. 1), Etah, Etawah, Mainpuri, Farokabad, Shajahanpur (Fig. 2) Hardoi, Lakhimpur-Kheri, Bharaich (Fig. 3), Lucknow, Gazipur and Gorakhpur. Of these, Etawah and Mainpuri are the main strongholds of the Sarus crane, followed by Shajahanpur and Lakhimpur-Kheri, thus, we surveyed these districts intensively.

Etawah lies entirely in the Gangetic plain but its physical features vary considerably and are determined by the rivers which cross it. The general excellence of the natural drainage afforded by the rivers and their tributary, streams and watercourses over the bulk of the district is exemplified by the general rarity of lakes and marshes. The only portions that might be considered an exception to this rule are the northern portions of the district in Etawah, Bharthana and Bidhuna tehsils. The important jheels are those at Hardoi, Raan, Parauri and Baralokpur in Etawah tehsil; Sarsainawar, Kunetha, Mahauri, Kudrel, Sonthna and Usarahar in Bharthana tehsil and Durmangadpur, Mundai, Hardoi, Barauli, Auton, Yakubpur, Tirhwa, Dhupkari or Thulpia and Manaura in Bidhuna tehsil. The last five all lying close to the Farokabad boundary.

The Kali Nadi forms the north-eastern boundary of the district separating it from Etah and Farokabad. During the rest of the year the volume of the running water is small and in years of unusual drought there is no apparent stream but the pools that remain are fed by the springs.

Mainpuri abounds in swamps and marshes, particularly in its central portion. In all 36,870 acres are recorded in the revenue record as under water. The Karimganj jheel in Mainpuri is nearly a mile in length by 300 yards in breadth, covering an area of 79 acres. There is a jheel at Paranunkha in Bewar, and in Ghiror there are several shallow jheels, the largest being at Pachawar, Bidhuna and Bigari. On the right bank of the Etawah branch of the Ganges canal in the extreme north-east of Barnahal lies the Saj Hajipur jheel, covering 61 acres. In Karhal block there are numerous lakes and marshes, the sources of the Ahnaiya, Puraha and Ujhiani streams. Of these the most important are the Deokali, 62 acres in area and very deep and the Sauj, of about 149 acres, which drains into the great Saman lake and is connected with the neighbouring Harer reservoir.

Shajahanpur lies in the northern part of Uttar Pradesh and is basically a agricultural belt with wheat fields dominating the landscape. Recently a lot of mechanized agriculture has been started. There are very few wetlands in this district with occassional ponds or ditches scattered here and there.

Lakhimpur lies entirely to the north of the state along the border with Nepal. This district forms part of the terai with huge grasslands present previously along the banks of the Sarda and Ghaghra rivers. Nowadays some remmants can be seen only in Dudhwa National Park and Kishanpur wildlife Sanctuary. However a number of rivulets and streams criss-cross the landscape but the district is totally in the sugarcane cultivation belt.

Methodology :

The study was conducted in February 2006 and April 2007 as winter and summer months are most suitable to survey the Sarus in the region (Sundar, 2005). We used various means of transports (by jeep, bus, train, etc.) to travel from one place to another to survey the cranes. However, on majority of the occasions we used hired jeeps as we found this mode of transport was ideal for a state like Uttar Pradesh to conduct such work. The vehicle was driven at a speed of 40 km/h and observations were make by members of the survey team on either side of the road to count the Sarus. Two persons sitting on either side of the vehicle also

constantly monitored the presence/absence of the Sarus cranes wherever we went.

During February, the crops on the field were not so high and the visibility was good enough to observe the cranes that were standing even at a distance of 100 m from the road. Care was taken to avoid double counting of cranes and in this respect, only cranes flying from our opposite direction were taken into consideration while counting. Cranes flying in the same direction in which we were traveling were not counted as we might count the same birds after a few meters on our way. Since it was a rapid survey we could not make equal number of trips to all the places. Secondly, we were mostly moving in hired vehicles wherever, motorable roads were there and cranes present on either side of the roads only were counted. There could have been many cranes far away from the roads deep wihin the cultivated patch that could have eluded from our observation.

Locations of the Sarus cranes were noted down and coordinates taken with the help of hand-held GPS and later on, the exact locations were marked on a map that has already been geo-referenced. We also noted various other parameters such as number of cranes, flock composition, habitat in which the cranes were recorded and if in an agricultural field the crop composition etc. Other than Sarus Cranes, we also recorded the number of long-legged wading birds like Painted Stork *Myeteria leucocephala,* Black-necked Stork *Ephippiorhynchus asiaticus*, Spoonbill *Platalea leucorodia* and related species which are often seen together with the cranes in the wetlands and inundated crop fields during our visit. Our presence sometimes attracted the attention of local villagers who wanted to know the purpose of our visit. However, this often ended in a sort of interaction wherein we started questioning them about the presence/absence of Sarus cranes in their locality. This was mainly to know the tolerance level of locals toward Sarus as cranes often damage their crops.

Results and Discusstion :

A total of 603 Sarus cranes were counted during our visit and the number of cranes seen in each location is given in Table 1. Maximum number of cranes was counted in Mainpuri district followed by Etawah (Table 2). As we did not make equal number of visits to all the locations, the number of cranes sighted in each location may vary marginally over the months. However, the survey provided a useful dataset of observations of the species in various districts of Uttar Pradesh.

Table-1. Number of Sarus cranes recorded in various districts of Uttar Pradesh in 2006 and 2007.

Site	Location	District	Date	No. of cranes in a flock
Sikandar Rao	27°51.38 N 78°11.32 E	Aligarh	02.02.2006	5
Shekha Jheel	27°51.28 N 78°12.96 E	Aligarh	02.02.2006	3
Around Aligarh	–	Aligarh	02.02.2006	30
Patna Jheel	27°31.58 N 78°18.80 E	Etah	02.02.2006	3
Narora	28°10.41 N 78°23.88 E	Aligarh	03.02.2006	4
Way to Mainpuri	–	Etah	04.02.2006	13
Nanglakel	27°11.84 N 79°03. 17 E	Mainpuri	04.02.2006	4
Kishni Road	–	Mainpuri	05.02.2006	10
Bhanwath	27°09.27 N 79°05.12 E	Mainpuri	05.02.2006	52
After Bhanwath	–	Mainpuri	05.02.2006	20
Saman	27°01.52 N 79°08.94 E	Mainpuri	05.02.2006	10
Kurra	26°59.56 N 79°06.80 E	Mainpuri	05.02.2006	22
Naharajaoura	26°59.09 N 79°07.78 E	Mainpuri	05.02.2006	4
Before Etawah	26°56.30 N 79°10.78 E	Etawah	05.02.2006	2
Parouli Ramayan	26°57.42 N 79°09.05 E	Etawah	05.02.2006	2
Barlokpur	26°59.95 N 79°10.57 E	Etawah	05.02.2006	3

Site	Location	District	Date	No. of cranes in a flock
Way to Bewar	–	Etawah	05.02.2006	11
–	26°00.01 N 79°14.72 E	Etawah	05.02.2006	11
–	27°02.70 N 79°15.96 E	Etawah	02.02.2006	6
–	27°10.97 N 79°17.74 E	Etawah	05.02.2006	4
Alipurkheda	27°18.61 N 79°09.42 E	Etawah	05.02.2006	5
Etawah-Bewar Hwy	–	Etawah	05.02.2006	2
–	27°05.08 N 78°58.17 E	Etawah	06.02.2006	2
–	27°02.03 N 78°57.16 E	Etawah	06.02.2006	12
Kharal	27°00.67 N 79°56.40 E	Etawah	06.02.2006	2
Saphai	26°59.37 N 79°56.61 E	Etawah	06.02.2006	4
Near Indian Oil Plant	26°47.14 N 79°04.82 E	Etawah	06.02.2006	7
–	26°47.10 N 79°08.91 E	Etawah	06.02.2006	2
–	26°46.56 N 79°09.37 E	Etawah	06.02.2006	2
Barthana	26°45.81 N 79°45.81 E	Etawah	06.02.2006	4
–	26°46.43 N 79°16.66 E	Etawah	06.02.2006	2
Nangla-Sawal	26°46.66 N 79°16.64 E	Etawah	06.02.2006	4
Near Barthana	26°43.39 N 79°12.46 E	Etawah	06.02.2006	3
–	26°19.48 N 79°29.59 E	Mainpuri	07.02.2006	2
Ugarpur	27°20.63 N 79°28.59 E	Farokabad	07.02.2006	11
Takharau	27°15.60 N 79°10.11 E	Mainpuri	07.02.2006	4
Way to Karhal	27°13.44 N 78°59.81 E	Mainpuri	08.02.2006	8
Way to Karhal	27°13.20 N 78°58.07 E	Mainpuri	08.02.2006	6
Way to Karhal	27°12.91 N 78°53.59 E	Mainpuri	08.02.2006	4
Bigrai	27°12.64 N 78°52.02 E	Mainpuri	08.02.2006	9
Ghiror	27°11.38 N 78°48.60 E	Mainpuri	08.02.2006	3
–	27°10.99 N 78°46.74 E	Mainpuri	08.02.2006	2
–	27°10.38 N 78°46.30 E	Mainpuri	08.02.2006	5
Bharol	–	Farokabad	08.02.2006	3
Aron	27°08.67 N 78°41.54 E	Farokabad	08.02.2006	4
Barnahal Road	27°09.71 N 78°49.75 E	Mainpuri	08.02.2006	11
Kosma	27°09.03 N 78°51.35 E	Mainpuri	08.02.2006	7
–	27°08.78 N 78°53.04 E	Mainpuri	08.02.2006	4
Bidhuna-Markant	27°08.73 N 78°53.74 E	Mainpuri	08.02.2006	4
–	27°08.27 N 78°54.02 E	Mainpuri	08.02.2006	2
Navateda	27°05.82 N 78°52.54 E	Mainpuri	08.02.2006	2
Karhal Road	27°02.01 N 78°55.62 E	Mainpuri	08.02.2006	4
Chamarpura	27°00.32 N 78°59.00 E	Mainpuri	08.02.2006	29
Near Chamarpura	27°00.39 N 79°00.16 E	Mainpuri	08.02.2006	100
–	27°00.51 N 79°01.83 E	Mainpuri	08.02.2006	17
–	27°00.76 N 79°24.21 E	Mainpuri	08.02.2006	18
Kurra	27°00.94 N 79°05.28 E	Mainpuri	08.02.2006	4
Kishni Road	27°01.59 N 79°12.43 E	Mainpuri	08.02.2006	5

Site	Location	District	Date	No. of cranes in a flock
Kusmara	27°06.91 N 79°15.78 E	Mainpuri	08.02.2006	2
–	27°09.39 N 79°10.85 E	Mainpuri	08.02.2006	2
–	27°10.03 N 79°08.86 E	Mainpuri	08.02.2006	4
–	27°11.47 N 79°06.24 E	Mainpuri	08.02.2006	6
Between Farokabad and Jalalabad	–	Farokabad	09.02.2006	8
Between Jalalabad and Shajahanpur	–	Shajahanpur	02.04.2007	8
Between Lakhimpur and Sitapur	–	Lakhimpur-Kheri	03.04.2007	4
–	28°05.84 N 80°58.93 E	Lakhimpur-Kheri	03.04.2007	3
–	28°09.25 N 80°59.05 E	Lakhimpur-Kheri	03.04.2007	3
–	27°59.06 N 81°.26.83 E	Lakhimpur-Kheri	03.04.2007	2
Between Nanpara and Lakhimpur	–	Lakhimpur-Kheri	04.04.2007	3
Between Paliakalan and Ghola	–	Lakhimpur-Kheri	04.04.2007	2
Between Ghola and Lakhimpur	–	Lakhimpur-Kheri	04.04.2007	2
Jhadital, Kishanpur WLS	–	Lakhimpur-Kheri	05.04.2007	4
Between Todarpur and Roza	–	Shajahanpur	12.04.2007	9
Near Hardoi	–	Hardoi	12.04.2007	2
				Total 603

Table-2. District-wise count of Sarus Cranes recorded in Uttar Pradesh.

District	No. of cranes
Aligarh	42
Etah	16
Mainpuri	393
Etawah	88
Farokabad	26
Shajahanpur	17
Lakhimpur	19
Bharaich	–
Varanasi	–
Lucknow	–
Gazipur	–
Gorakhpur	–
Hardoi	2
	Total 603

Out of 603 cranes recorded, 481 were counted in Etawah and Mainpuri districts. According to Sundar (2005), these two districts have a population of 2,500-3,000 cranes. This is almost equal to *c.* 30% of the estimated global population of *G. a. antigone* (8,000-9,000 individuals) and nearly 10% of the estimated global population of the species (25,000-37,000; Meine & Archibald, 1996).

The reason why the neighbouring district of Aligarh supports a considerable number (Table-1) of Sarus cranes may be due to similar topography and agricultural crop pattern. Whereas, some isolated Sarus population (Table 2) in Lakhimpur-Kheri district in northern Uttar Pradesh bordering Nepal is encouraging. Had we surveyed the areas as intensively as we did it in Mainpuri and Etawah, we could have recorded few more cranes. Nonetheless, a previous record (Gole, 1989) shows that Lakhimpur-Kheri and the neighbouring Pilibhit districts had an estimated population of over 1,500 cranes. Sundar *et al.*, (2000b) estimated a population much lower than what Gole had reported from these two districts. However, during our visit to Kishanpur Wildlife Sanctuary in Lakhimpur-Kheri district in April 2007, we saw 4 cranes in the sanctuary's Jhaditaal. Prior to this, one of the authors (GM) had seen a pair of Sarus crane in Banketaal of Dudhwa National Park of Lakhimpur-Kheri district in 1996. It seems that the cranes do migrate from the neighbouring districts to these areas in search of new territories. Even though, there are many wetlands in the district, much of the agriculture here is dominated by sugarcane and this proportion is increasing day by day. Since the Indian Sarus crane prefers wide open landscapes with a mosaic of wetlands and fields with wet crops of moderate height, sugarcane cultivation in

Lakhimpur-Kheri district would continue to deter the Sarus.

In majority of the districts, the cranes were sighted in wheat and paddy fields and only on a fewer occasions we had come across Sarus in the wetlands. However, in two districts (Etawah & Mainpuri) as the wheat harvesting had already been carried out, almost all crane sightings were in fallow agricultural lands. In these districts, we had witnessed the congregation of Sarus while they assembled to feed on the harvested wheat grains.

We recorded a flock consisting of more than 100 cranes in Chamarpura (27°00.39 N, 79°00.16 E) near Karhal block of Mainpuri district on 8 February, 2006. All the birds were seen in a post-harvested wheat field. Similarly, we counted 52 Sarus cranes in Bhanwath (27°09.27 N, 79°05.12 E) in Mainpuri district on 5 February 2006, but in a wetland. Similarly, big flocks had been observed regularly in these districts by Sundar (2003). According to some studies (e.g., Vyas 1999) in areas with large wetland tracts, Sarus used more wetlands and in areas where agriculture dominated, they used more crop fields. Our observation of a big flock during February (winter in this region) seems contrary to Mukherjee *et al.*, (1999) statement of large flocks gather to roost along the wetlands and also along the shores of the lakes and rivers during summer especially between April and July. However, on a majority (24%) of the occasions (N = 74), we recorded a pair of Sarus crane followed by a small flock comprises of four (23%) cranes—possibly of an adult male and a female with two juveniles. Occurrence of two adults together (probably a pair) on many occasions reflects the availability of year-round water supply needed for the pair.

Why are there so many cranes in the districts of Etawah and Mainpuri? The area bordering the two districts, around the towns of Saiphai, Karhal, Saman and Baralokpur, has a landscape simply supporting the big population of Sarus cranes. Large to medium sized natural marshlands with reeds, grasses and tuberous plants are abound in plenty, interspersed with patches of agricultural fields. An extremely well articulated canal system spreads over the countryside ensures a perennial water supply. Seepages from the canals form a small to medium sized wetlands which remain throughout the year, without depending solely on the monsoon.

It seems that in Etawah and Mainpuri, both breeding and non-breeding populations of Sarus exist. The breeding birds are easily identified as they remain in pairs and defend a well-defined territory. The non-breeders however, comprise newly weaned young, looking for partners as they grow up and newly-formed pairs that have been unable to corner a territory. They possibly live in congregations to reduce the risk of predation and to enhance the possibility of finding food. The large marshlands amidst crop lands of Etawah and Mainpuri are little disturbed and thus support large flocks of non-breeders.

Population of Sarus cranes is highest in Uttar Pradesh. Almost 75% of the total area of the state is cultivated. Most of the Sarus sightings were from the agricultural fields. However, they are never far from water—mainly lakes and water-logged areas created by seepage from canals. Sarus pairs, though utilizing agriculture and other dry areas more than families were still never too far from water. They invariably returned to roost in the wetland sites at the end of the day.

Next to wetlands and cultivation, two other habitats were seen to be significant in the life of the Sarus—fallow lands and wastelands. These open spaces served as gathering and lofing points and had a peculiar function. A burgeoning human population and changing agricultural system are taking their toll on the Sarus and other resident fauna. Natural components of the landscape including scrublands, grasslands, marshlands and even inhospitable alkaline wastelands are rapidly being converted into fields. The conversions destroy crucial wetland habitats, resulting in the displacement of non-breeding 'buffer' flocks. The increase in population is also leading to a fall in the average size of land holdings per farmer. This makes the farmers less tolerant towards the nesting cranes. In the fields, Sarus uproot paddy to build their large nests and also feed on the crop when it ripens.

Besides, there are plans to convert waterlogged areas into crop fields by building canals to drain the water from low-lying areas so that they can be cultivated. The world's densest Sarus Crane population is thus in imminent danger. Draining the wetlands will render the flocks homeless and force them to look for roosting sites elsewhere. Since this is the only known site of its size and quality in the country, no vacant alternative sites would be available to them. The

development plan, will not spare even the smaller wetlands. The territorial pairs will thus have to make a fair amount of adjustment in their annual cycles, feeding routines and territories. Natural foods will be unavailable and they will have to rely on those foods that are obtained from crop fields. This will naturally mean increased crop depredation, resulting in the farmers' growing antagonism towards the cranes. It will only be a matter of time before the Sarus of Etawah and Mainpuri are reduced to spread-out pairs, with flocks becoming a thing of the past.

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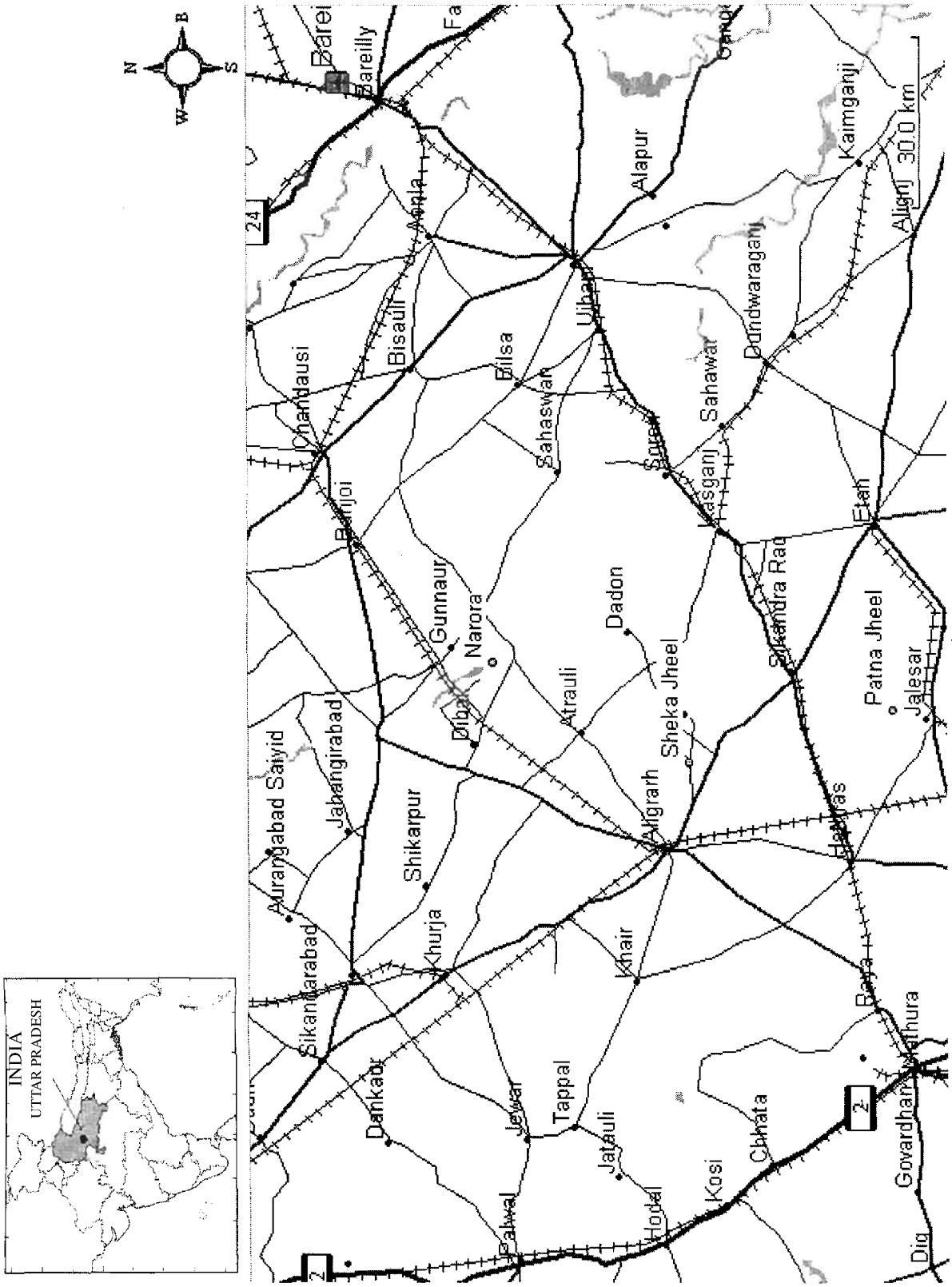

Fig. 1. Showing (white circles) the localities where Sarus Cranes were recorded in Aligarh and the surrounding places of U.P.

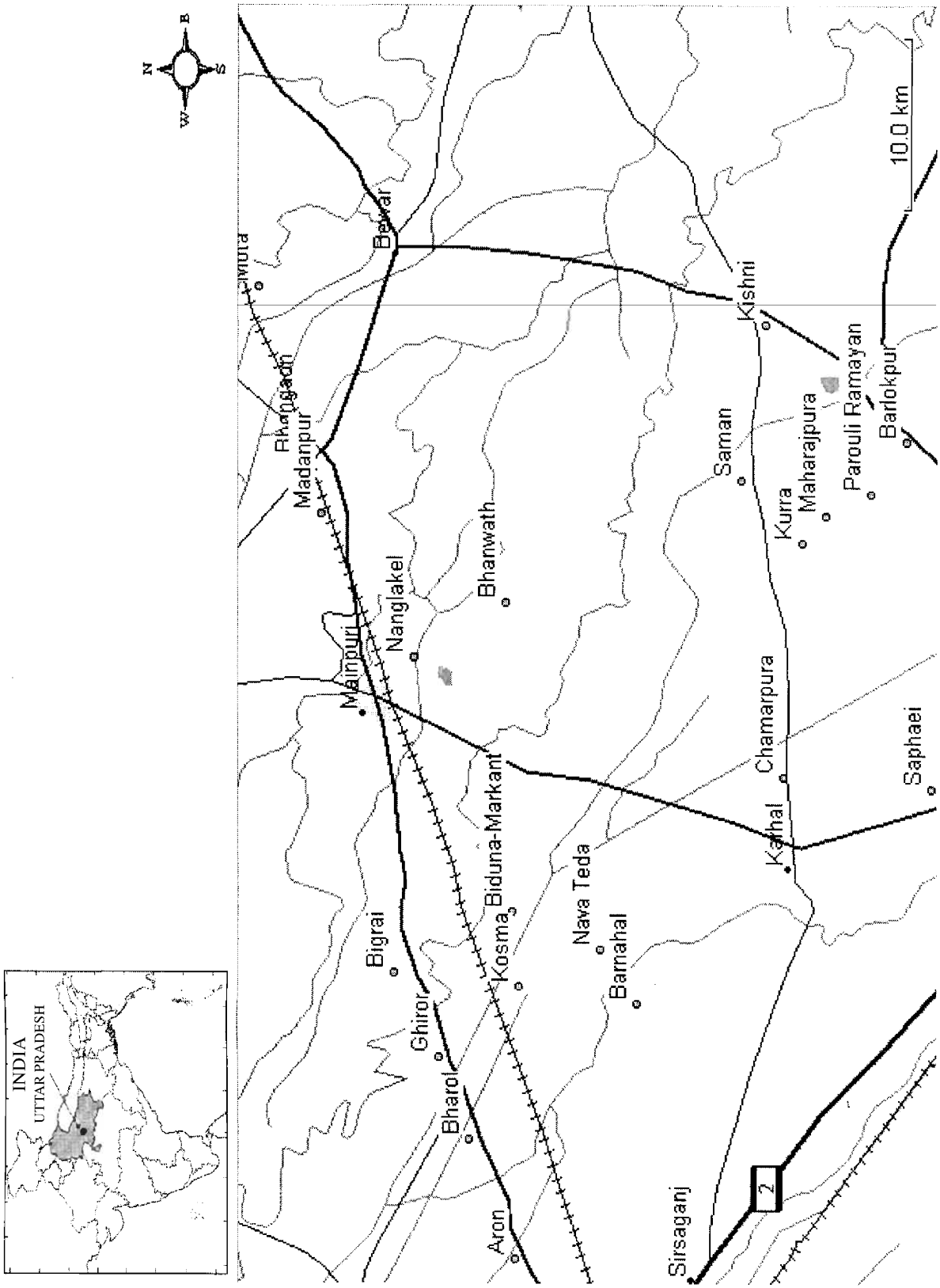

Fig. 2. Showing (white circles) the localities where Sarus Cranes were recorded in Etah, Etawah and Farookabad districts of U.P.

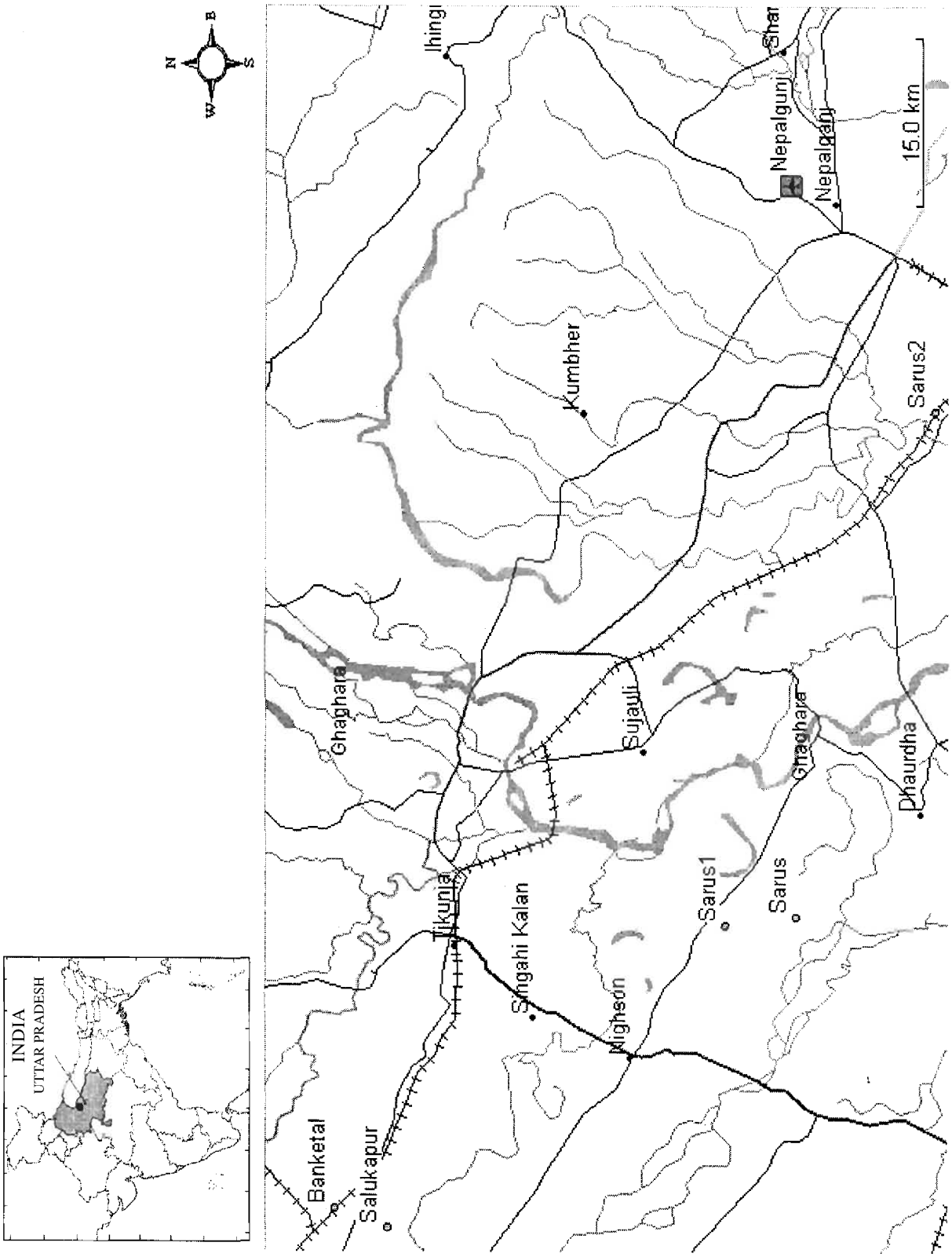

Fig. 3. Showing (white circles) the localities where Sarus Cranes were recorded in Lakhimpur-Kheri, Bharaich and the surrounding districts of U.P.

PLATE I

Sarus Crane pair in wheat field in UP
(Photo : ***G.Maheswaran***)

Sarus Crane pair in wheat field
(Photo : ***G.Maheswaran***)

Sarus Crane male at edge of field
(Photo : ***GMaheswaran***)

Sarus Crane pair at on wetland
(Photo : ***GMaheswaran***)

Sarus Crane pair at Patna Bird Sanctury, Etah District, UP (Photo : ***G.Maheswaran***)