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Recent records of wintering White *Ciconia ciconia* and Black *C. nigra* storks and flocking behaviour of White-necked Storks *C. episcopus* in Maharashtra and Karnataka states, India

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European White Storks *Ciconia ciconia* and Black Storks *Ciconia nigra* are regular winter migrants to India, and are widespread in the country, usually occurring in low densities in their winter habitat (Ali & Ripley 1968). There are few sites with regular annual observations of numbers of these species in their wintering grounds (Pande et al. 2003). Resident White-necked Storks *Ciconia episcopus* are usually seen as single birds or in pairs (Ali & Ripley 1968) similar to the habits of European White Storks, while Black Storks are seen mostly in flocks of varying sizes. Flocks of White-necked Storks in India are known to occur but there is little published information on this aspect (Santharam 1996; Sundar 2006). We carried out counts of these three species at some sites in Pune and Satara districts of Maharashtra, and Belgaum district of Karnataka in the winter of 2005–2006. Generally these storks occur in low densities on particular water bodies and hence their surveillance is important.

Methods

All sites, except Dhebewadi, were visited twice every month from October 2005 to the end of May 2006. Dhebewadi was visited only on one occasion. In addition to these sites several other water bodies were also visited but storks were not seen there. The water bodies without the storks were both seasonal and perennial but were regularly frequented by people and were adjacent to villages, while water bodies where storks were seen were about 3 to 4 km from villages and were secluded. Additionally, Hidkal reservoir in Karnataka is a sensitive area due to the location of a dam, and entry is restricted. Our visits to the various sites were a part of an ongoing monitoring for waterbirds specifically to look for wintering storks in view of our past experience (Pande et al. 2003).

We used the non-parametric Kruskal-Wallis test to establish the difference in flock sizes of White-necked Storks observed by us from October to December versus those from January to March, in the study areas for Maharashtra and Karnataka, and for both combined.

Plumage characteristics were used to distinguish adult and juvenile Black Storks. Adult Black Storks are glossy-black with a white lower-belly and breast conspicuous in flight, coral-red beak and legs, and with red periorbital skin. Juvenile Black Storks have an overall brownish plumage with grey-green beak, legs and periorbital skin (Ali & Ripley 1968). Plumage characteristics are inadequate to



Flock of White-necked Storks *Ciconia episcopus* with solitary European White Stork *C. ciconia*

separate young and adult in European White Storks and White-necked Storks.

Study area

Counts of all three focal storks were maintained at five sites, four in Pune and one in Karnataka (Table 1). All flocks of White-necked Storks during the visit, even those out of the focal sites, were maintained separately. These flocks were grouped by state (Maharashtra and Karnataka) and the largest flock seen each fortnight was documented. All sites except Dhebewadi are small to moderate irrigation reservoirs. Dive and Naygaon are about 200 x 200 m in size respectively while Pangara is about 300 x 300 m in extent. All are perennial except Dive, which dries up by late March. The altitudes for these sites ranges from 644–850 m. All sites are surrounded by cropland with bajra, jowar, maize, sunflower, gram, peas, ground-nut and interspersed with groves of guava, custard apple and figs. At Naygaon a new poultry complex has mushroomed on the bank and the waste is drained into the reservoir causing both pollution and a threat of disease to birds using the tank. Naygaon and Hidkal Reservoirs are regular wintering sites for Black and European White Storks. We have documented their occurrence at these sites from 1997 (Pande et al. 2003). During winter (October–February) the temperature is between 5°–25°C and in early summer (March onwards) between 15°–32°C. During our fieldwork, mornings were foggy and chilly in winter, and pleasant and clear in early summer. Counts at reservoirs were conducted by walking around each site and scanning through binoculars; 100 coverage of the sites was achieved during each survey. About six hours were spent at each site.



European White Stork *C. ciconia*

Results

The numbers of Black and European White storks recorded at the sites are summarized in Table 1. Black Storks were more numerous than Eurasian White Storks at all sites, when both were seen. Just one site had only Eurasian White Storks (Dhebewadi). Hidkal had only Black Storks. We recorded three European White and 56 Black Storks. Juveniles comprised 25% of all Black Storks seen, indicating a healthy recruitment rate (Table 1). Flocks of 4–24 White-necked Storks were seen in Maharashtra and 60–80 at Ballari Nulla near Hidkal, with either European White or Black Storks. Flock sizes of White-necked Storks are given in Figure 1. At Dive and Naygaon these congregations were largest in early summer when other seasonal water bodies dried up. In Maharashtra, we noted congregations of up to 24 White-necked Storks till mid-March, after which they were not seen. The Ballari Nulla starts drying from end of December and then a marshy area is created in this region. Up to 80 White-necked Storks with a few Asian Open-bill Storks *Anastomus oscitans*, and sometimes Black Storks, congregate

at this site until the site dries up in January. However flocks of up to 36 White-necked Storks were seen at Hidkal until mid-March. Flock sizes of White-necked Storks varied significantly between winter and summer in both Maharashtra (Kruskall-Wallis +2 = 8.4, $P = 0.004$) and Karnataka (Kruskall-Wallis +2 = 4.3, $P = 0.03$). The largest flocks were seen in summer in both states (Maharashtra: mean \pm SD = 19.5 \pm 3.4; Karnataka: mean \pm SD = 36.3 \pm 22.4), rather than in winter (Maharashtra: mean \pm SD = 8.2 \pm 3.6; Karnataka: mean \pm SD = 13.7 \pm 10.5).

When Black and European White Storks were seen together, they did not intermingle and foraged separately. However, White-necked Storks intermingled freely with Black



Flock of Black Storks *Ciconia nigra*

or European White Storks with no apparent aggression while foraging or soaring.

We recorded the storks resting and feeding on the banks of the reservoirs. Black Storks and White-necked Storks foraged frogs, crabs and mollusks, while European White Storks fed on locusts and other insects. Marshy river banks and drying shallow ponds were primary foraging areas for these species. In these areas aquatic animals are exposed and presumably more accessible. The Black Storks were last seen on 5.v.2006. Departure date for European White Storks was 13.iii.2006. One European White Stork that was found exhausted at Dhebewadi, died after six days in spite of medical treatment.

Discussion

The wintering South Asian population of the Eurasian White Stork is unknown while this number for Black Storks is estimated to be c. 7,500 birds (Wetlands International 2006). The annual counts collated from the mid-winter waterfowl census in India from 1997–2001, for the two species, are as follows: Eurasian White Stork: 0, 25, 32, 0, 41; Black Stork are 5, 74, 146, 1, 145 for years 1997, 1998, 1999, 2000 and 2001 respectively (Li & Mundkur 2004). Their census figures from our earlier observations (Pande et al. 2003) as well as from this study are given in Table 2. Numbers in southern India, however, are exceedingly low for both species, and numbers of at least the Black Storks are relatively high. In particular, Naygaon and Hidkal are excellent sites for these species, and require attention in terms of closer monitoring and improvement of habitat. At two other sites namely Veer, Pune and Garade Dam, Pune both within 10 km of Naygaon we had recorded Black Storks in 1997, 2001, 2002 and 2003 but we did not see any in 2005–2006. In earlier counts, we estimated recruitment to be 11.7% from Amravati, Maharashtra (Pande et al. 2003), which is much lower than the 25% recorded during this study. This further strengthens the importance of the study sites for this species. It will be worth documenting recruitment of this species in other locations in

the country to see if they vary. The nominate race of the White-necked Stork that are found in India is estimated to number over 200,000 birds (Wetlands International 2006). Counts from our intensive study cannot be directly compared with the more extensive mid-winter waterfowl census, but show the need for more stringent counting techniques to be able to use the counts for evaluating the population size of waterbird species. Regional, more regular censuses carried out repeatedly in the same sites provide data that can be confidently used to indicate inter-annual differences in numbers and recruitment rates.

Seasonal differences in flock sizes of White-necked Storks could be a result of the birds concentrating in the summers in the water bodies that continue to have some water. Similar observations have been made at Vazhani Reservoir and Periyar Tiger Reserve, both in Kerala by Santharam (1996) who reports flock sizes of 10–50 birds in early summer. Local migration in this species is recorded (Ali 1996), and varying densities in the same area between seasons are also reported (Sundar 2006). Also, Sundar (2006) reports on observations of 223 “flocks” of this species, the mean flock size of which was 2.5, with less than 40 observations constituting of flocks of 5–10 birds, and less than five observations of flocks larger than that. But the largest flocks in this study were seen in winter. This was likely due to younger birds getting together after the breeding season, and due to an excellent irrigation system in the study area (Etawah-Mainpuri districts, Uttar Pradesh; Sundar 2006) that prevented completely drying up of wetlands during the dry season. Seasonal patterns in flocking appear to vary between areas in the country and are worthy of detailed investigation. However, some of the flocks of White-necked Storks reported here are clearly larger than earlier records. We feel that early summer may be a better season to count resident water birds in the few perennial water bodies that remain in the landscape, and at selected seasonal water bodies that start drying at this time.

The threat to Naygaon Reservoir from the poultry complex is serious, especially in the scenario of recent bird flu epidemic amongst poultry in India. Dive is a privately owned water



Mixed flock of White-necked *Ciconia episcopus* and Black *C. nigra* storks

body in scrubland with no immediate threat of human disturbance. Pangare is a public irrigation reservoir with surrounding cropland where pesticides and rodenticides are used indiscriminately, but farmers are tolerant of migratory birds. Hidkal is well protected and faces no threat as of now.

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Table 1. Recent records of *Ciconia ciconia* and *C. nigra* in Maharashtra and Karnataka states, during 2005–2006

Place	Date	Coordinates	<i>C. ciconia</i>	<i>C. nigra</i> (adult, juvenile)
Dhebewadi, Satara, Maharashtra	2.x.2005	17°14'27''N 73°57'30''E	1	0, 0
Dive, Pune, Maharashtra	1.i. 2006 15.i. 2006 13.iii. 2006	18°24'95''N 74°0'E	1	0, 0 8, 0 8, 4
Naygaon, Pune, Maharashtra	21.i. 2006	18°8'N 74°12'E	0	8, 4
Pangare, Pune, Maharashtra	12.ii. 2006	18°14'60''N 73°03'90''E	1	10, 8
Hidkal, Belgaum, Karnataka	18.iii. 2006 05.v. 2006	16°09' N 71°38' E	0	3, 2 5, 0

Figure 1. Flocks of White-necked Storks *Ciconia episcopus* observed in Maharashtra and Karnataka (2005–2006). * Indicates period when water bodies frequented by White-necked Storks began drying and turning into a shallow marshy area.

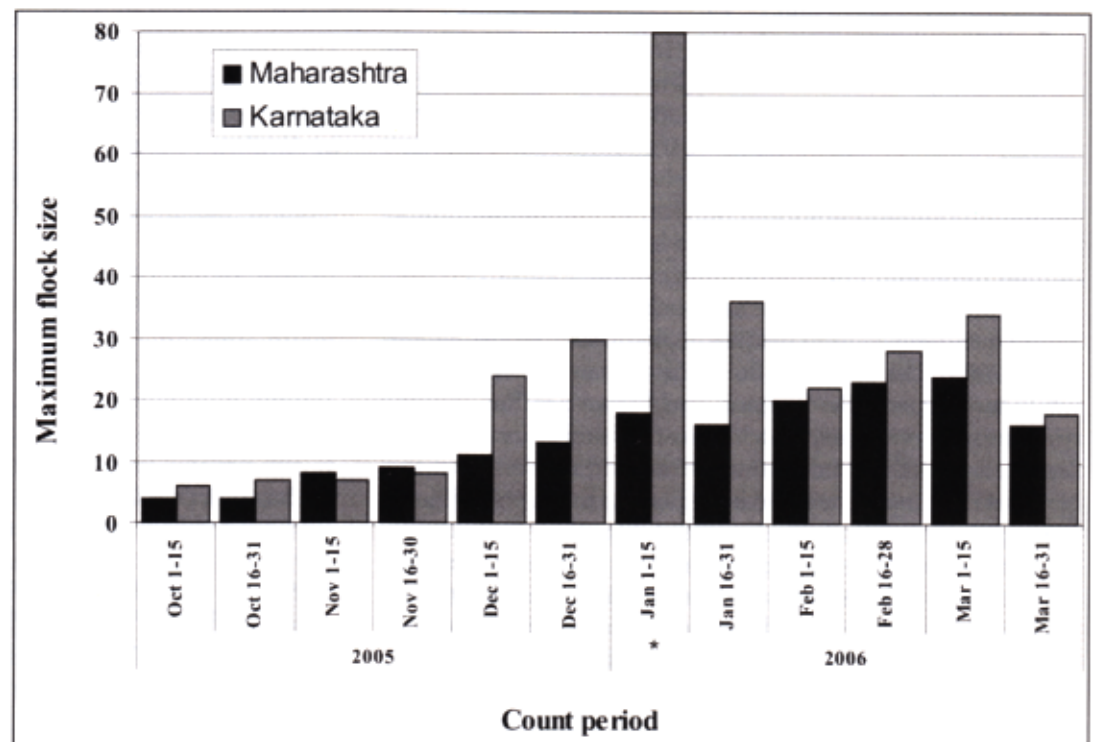


Table 2. Counts of two stork species made during the annual mid-winter waterfowl census (1997–2001) compared with counts made during our previous study (1997–2004) and this study (2005–2006)

Year	AWC Counts (Li & Mundkur 2004)		Counts from Pande <i>et al.</i> 2003 (8 sites)		Counts from this study (5 sites)	
	White Stork	Black Stork	White Stork	Black Stork	White Stork	Black Stork
1997	0	05	0	07	—	—
1998	25	74	0	02	—	—
1999	32	146	0	06	—	—
2000	0	01	0	03	—	—
2001	41	145	0	05	—	—
2002	—	—	0	12	—	—
2003	—	—	0	13	—	—
2004	—	—	0	06	—	—
2005	—	—	—	—	1	0
2006	—	—	—	—	2	56

Sighting of Sarus Crane *Grus antigone* near Telineelapuram, Srikakulam district, Andhra Pradesh

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Rao, K. M. 2007. Sighting of Sarus Crane *Grus antigone* near Telineelapuram, Srikakulam district, Andhra Pradesh. *Indian Birds* 3 (1): 32.
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Telineelapuram (Srikakulam district, Andhra Pradesh, India) is a small village, 5 km from Tekkali town and 3 km from Naupada railway station, on the Visakhapatnam–Howrah railway line. The large heronry of Grey Pelicans *Pelecanus philippinus* and Painted Storks *Mycteria leucocephala* at the village has made it an Important Bird Area (Islam & Rahmani 2004). Birds arrive at the village during September/October and build nests on the trees in the village. Since two years about 3,000 Open-billed Storks *Anastomus oscitans* have been visiting the village pond, Patha Cheruvu.

For the last three years I have been hearing the call of a Sarus Crane *Grus antigone* but was unable to see the bird. Finally on 23.i.2006 I saw the bird in the paddies near Telineelapuram, while birding with K. Ramana and Viswesara Rao, a local resident and, temporary watchman of the sanctuary. Villagers reported that the bird roamed the paddies here and the Naupada swamps. They also informed me that a pair of Sarus was regularly seen four years ago but since the last two years only one bird was being seen. According to the villagers, the lone bird was still around in the third week of September 2006.

These sightings are significant in that recent status surveys of Sarus Cranes in India do not include Andhra Pradesh within the species' range of distribution (BirdLife International 2001; Sundar *et al.* 2000). Villagers' observations indicate that even though the Sarus Cranes are in very low density here, breeding

does not seem to be occurring, and mortality seems to have occurred with no information on the manner of one crane's death. Their observations also suggest that the cranes are resident and not seasonal visitors. The distribution of Sarus Cranes in India is largely contiguous, but disjunct populations, like this sighting in Andhra Pradesh, are known to occur in Chandrapur, (Maharashtra), Pong Dam (Himachal Pradesh), and Khatua wetlands (Jammu & Kashmir) (Sundar & Choudhury 2003).

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[Editors' note: Mr Rao's letter, posted on 25.ix.2006 reached us on 2.iii.2007!]