

## Short Communication

# Clutch size of sarus crane *Grus antigone* in the Northern Plains of Cambodia and incidence of clutches with three eggs

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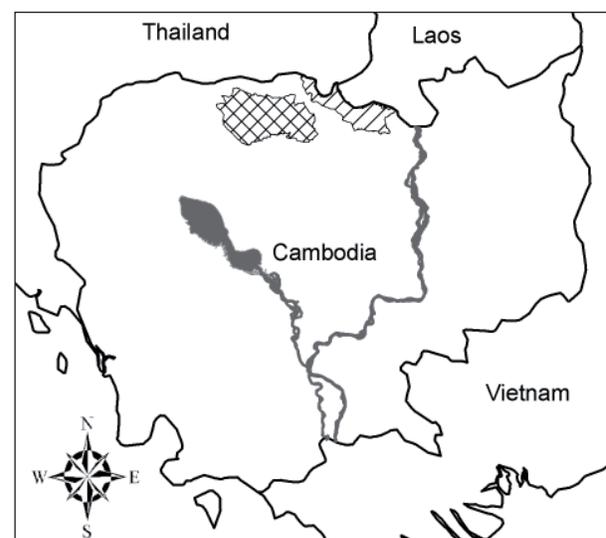
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From 2003 to 2009, 254 nests of sarus crane *Grus antigone*, a globally Vulnerable species with key populations in Cambodia (Birdlife International, 2010), were recorded in the Kulen Promtep Wildlife Sanctuary and Preah Vihear Protected Forest, Preah Vihear Province, northern Cambodia (Fig. 1). For an example of nesting habitat, see Fig. 2. Most nests were reported to researchers of the Ministry of Environment, the Forestry Administration and the Wildlife Conservation Society (WCS) during the course of a bird nest protection programme in the Northern Plains landscape (Clements *et al.*, 2010).

Large bird species in these areas are threatened by human disturbance and, particularly, the collection of eggs and chicks by local communities, who either consume them or sell them to middle men in the wildlife trade. The bird nest protection programme was initiated in 2002 to locate, monitor and protect the remaining nesting sites of key species. Local people are offered a monetary reward for reporting nests, or are employed to monitor and protect the nest sites until the chicks fledge. All reported sarus crane nests are protected. It is very likely that the great majority of cranes breeding in the Northern Plains are detected, because large numbers of local community members are present in the forest and the incentive to report nests is

high. The protection teams are visited every one-to-two weeks by village rangers and WCS monitoring staff to check the status of the nests. Nests are checked using binoculars from a distance if possible and extreme care is taken not to disturb nests excessively, which might cause abandonment.

Clutch size was recorded for 171 of the 254 nests. Twenty-two nests (12.9%) contained one egg and 147 nests (86%) contained two eggs. In two



**Fig. 1** Map showing the location of Kulen Promtep Wildlife Sanctuary (cross-hatching) and Preah Vihear Protected Forest (simple hatching).

nests (1.2%), both in KPWS in 2009, there were three eggs. It is possible that clutch size may have been under-recorded in some cases, particularly for nests with one egg, which may have been partially predated prior to checking, or another egg may have been laid after checking. It is unlikely that the third egg was laid by an additional female because sarus cranes are highly territorial during the breeding season, and nest parasitism has never been confirmed in any crane species (Kathju, 2007).

Sarus cranes, like most cranes of the genus *Grus*, normally have a clutch size of two eggs and rarely one (e.g. Johnsgard, 1983; Meine & Archibald, 1996; Ellis *et al.*, 1996; see also Table 1). A clutch size of three eggs is extremely rare (Table 1). There is only one record of a nest with four eggs from India (Sundar & Choudhury, 2003). The clutch sizes in the Northern Plains of Cambodia were broadly comparable to other populations of this species. The percentage of nests with three eggs ranges from 0.0% to 2.7% in different studies, and if all nests in Table 1 are combined, three-egg clutches account for 0.8% (five out of 647 nests).

In both nests in the present study, all three eggs hatched and the chicks survived for at least 12 and 16 days respectively. By this time the monitoring ended, because the chicks were mobile and thus more difficult to monitor and less susceptible to poaching. This successful hatching of all three chicks in a three-egg clutch is rare, as breeding pairs of sarus cranes characteristically raise only one or two chicks each year (e.g. Borad *et al.*, 2002). It is suspected that the second egg is laid as an insurance in case of the loss of the first one (Meine & Archibald, 1996), and clutches of more than two eggs may be suboptimal for cranes to incubate (Sundar & Choudhury, 2005). In two clutches of three eggs in India, the adults abandoned the third egg after two chicks hatched, even when it was fertile (Sundar & Choudhury, 2003; Kathju, 2007).

There are only very few cases where the successful raising of three chicks in sarus crane has been reported. Sundar (2006) described two pairs encountered with three fledged chicks of the same age. Pairs with three chicks of apparently similar age have also been observed in migrating flocks

**Table 1** Unusual clutch sizes of sarus cranes recorded in various studies. For the Northern Plains of Cambodia (this study), the combined percentage of three-egg clutches was 1.2% (two out of 171 nests).

Location	No. of nests examined	No. of nests containing one egg (%)	No. of nests containing three eggs (%)	Source
Kulen Promtep Wildlife Sanctuary, northern Cambodia	75	14 (18.7)	2 (2.7)	This study.
Preah Vihear Protected Forest, northern Cambodia	96	8 (8.3)	0 (0.0)	This study.
Kheda District, Gujarat State, India	70	1 (1.4)	0 (0.0)	Mukherjee <i>et al.</i> (2002).
Gujarat State, India	73	no data	1 (1.4)	Kathju (2007).
Keoladeo National Park, Rajasthan, India	132	4 (3.0)	2 (1.5)	Walkinshaw (1973; cited in Sundar & Choudhury, 2005).
Keoladeo National Park, Rajasthan, India	11	2 (18.2)	0 (0.0)	Ramachandran & Vijayan (1994; cited in BirdLife International, 2001).
Southeast Rajasthan, India	33	10 (30.3)	0 (0.0)	Vyas (1999; cited in BirdLife International, 2001).
Etawah and Mainpuri districts, Uttar Pradesh, India	157*	40 (25.5)	0 (0.0)	Sundar (in litt. 2010).

\*One nest (0.64%) in this sample contained four eggs (Sundar & Choudhury, 2003).



**Fig. 2** Sarus crane nesting habitat and nest with two eggs in grassland in open deciduous dipterocarp forest in the Kulen Promtep Wildlife Sanctuary, Preah Vihear Province, northern Cambodia, June 2007 (© M. Handschuh/ACCB).

in Cambodia (G.W. Archibald verbally, cited by Sundar, 2006). In none of these cases had the actual nests been seen, but the families were encountered after the chicks had fledged. Thus, it is possible that one or two chicks had been adopted by a different pair, or joined a different family after being separated from their own parents. Unfortunately, it was not possible to determine whether the chicks in the two cases from Cambodia, reported here, survived until fledging.

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