

Notes on the breeding ecology of monocled cobras (*Naja kaouthia*) from areas adjacent to Sundarban, India

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INTRODUCTION

Monocled cobras (*Naja kaouthia*) are the commonest venomous snakes in Sundarban and adjacent areas such as Canning (West Bengal, India). Though these snakes are a major cause of venomous snakebite and an important component of the ecosystem in this area, their ecological and behavioural aspects have received limited attention. As in other *Naja* spp., *N. kaouthia* are egg layers but periods for egg deposition vary. For example, Kopczynski (1993) reported that captive monocled cobras, imported from Thailand, deposit eggs between January and March whilst Das (2002) and Whitaker & Captain (2004) indicated January – March as the egg laying season. The incubation period of *N. kaouthia* is around 50 days (Kopczynski, 1993; Das, 2002) indicating hatchlings should appear from the end of February to May. However, Ahmed et al. (2009) reported that neonate cobras have been observed in Assam (India) in August which suggests *N. kaouthia* may have different breeding seasons in different regions. In this paper we present observational data on the breeding season of *N. kaouthia* from areas (Canning [88.76 E, 22.32 N] and Taldi [80.61 E, 22.35 N], Fig. 1) adjacent to the Sundarban mangrove forest in south West Bengal state, India.

METHODS

A local organisation – Canning JSS – conducts snake rescue operations in these areas and rescued snakes are handed over to forest department officials of the Sundarban Tiger Reserve (STR). Between 1 September, 2016 to 31 April, 2017 we accompanied the rescuers of Canning JSS when they received calls for snake rescue. Whenever juvenile *N. kaouthia* were found, their snout to vent length (SVL) and tail length (TL) were measured and photographs were taken. To reduce stress to the snakes and also to minimise the risk of the rescuers, scale count and sex determination were not carried out.

RESULTS & DISCUSSION

Neonates were rescued from October to early December (Fig. 2). In several instances, multiple snakes were found at the same site. The first six individuals were rescued on 3 October, 2016 from a hole in an abandoned house at Matla G.P. area, Canning (22.3133 N, 88.7344 E) and had a mean SVL of 30.07 cm and mean TL of 5.5 cm, the smallest

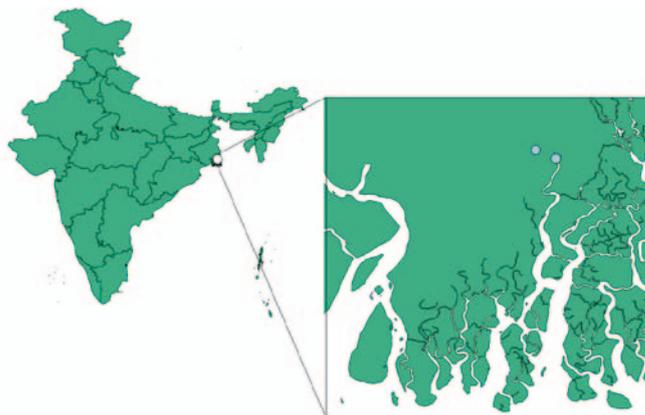


Figure 1. Map showing the locations of rescue

having a SVL of 28 cm and a TL of 5 cm. The highest number of juveniles (N = 19) were rescued in November. The last five snakes were found on 1 - 2 December. The data are tabulated in Table 1. It was reported that baby cobras first emerge in late September and females observed guarding eggs from late July to August (Joydeb Sardar pers. comm.). No juveniles were reported between December to early February, presumably due to this being the hibernation period. The first individual to be found after winter was rescued on 14 March, 2017 with a SVL of 41 cm and TL of 7 cm. These data therefore suggest that *N. kaouthia* show a late rainy - early winter reproductive season in this area.



Figure 2. Juvenile *N. kaouthia*

Table 1. Table summarising the measurement data of rescued juvenile monocled cobras (*N. kaouthia*); SD = Standard Deviation, Min. = Minimum SVL, Max. = Maximum SVL

Month (Year)	Number	SVL (mean \pm SD)	Min. - Max.	TL (mean \pm SD)
October (2016)	10	30.8 \pm 1.95	28 - 35	5.67 \pm 0.47
November (2016)	19	31.89 \pm 1.99	29 - 36	6.08 \pm 0.67
December (2016)	5	33.4 \pm 2.77	29 - 36	6.1 \pm 0.89
March (2017)	1	41 \pm 0	-	7.0 \pm 0

N. kaouthia in Sundarban, a low-lying coastal area, are said to be semi-aquatic (Whitaker & Captain, 2004). In this region agricultural areas (mainly paddy fields, a favourite habitat of *N. kaouthia*) remain wet from July to December. Being a coastal area, here winter is brief but cold (around 10° C) with lowest temperatures in January. These climatic factors likely play important roles in the breeding season of *N. kaouthia* in Sundarban and adjacent areas.

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