

INSTALLATION OF ARTIFICIAL NEST CAVITIES FOR THE ENDANGERED GREAT HORNBILL: A PILOT STUDY IN SOUTHERN INDIA

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ABSTRACT. – Six nest boxes designed for the Great Hornbill (*Buceros bicornis*) were installed in November–December 2007 in large trees in wet evergreen forests at six study sites in the Anaimalai Hills region of the southern Western Ghats located in the state of Kerala, India. By the end of two nesting seasons, the hornbills had shown interest in the nest box trees and the nest boxes, but no nesting occurred in any of the nest boxes. Nesting in nest boxes usually takes three seasons with the Great Hornbill.

This paper was presented at the 5th International Hornbill Conference jointly organised by the National Parks Board (Singapore) and the Hornbill Research Foundation (Thailand), in Singapore on 22nd–25th March 2009.

KEY WORDS. – Great Hornbill, nest boxes, India, *Buceros bicornis*.

INTRODUCTION

We have shown that the Great Hornbill (*Buceros bicornis*) utilizes the largest trees when both foraging and nesting (Kannan & James, 2008; James & Kannan, 2009). We have also showed that there was a scarcity of trees of the size in which the hornbill commonly nested in (James & Kannan, 2009). Therefore, the present study was initiated to produce nesting sites in large trees that lacked them by erecting nesting boxes designed to fit the needs of Great Hornbills. The objective is to produce an increase in numbers of Great Hornbills by providing increased nesting opportunities. This activity is justified because of the hornbill's scarcity in India, the site of the study, due to several problems (James & Kannan, 2009), resulting in its being designated an endangered species (CSE, 1982) and listed in Schedule I (most protected) of the Indian Wildlife (Protection) Act of 1972 (MoEF, 2006).

STUDY AREA

The study area was located in Kerala, a southwestern coastal state in India, and precisely in the Vazhachal forest division extending on the north from the vicinity of Nelliampathy to

Parambikulam southward to the Edamalayar-Pooyamkutty Valley. This is in the Anaimalai hills region of the southern Western Ghats characterized by the extensive moist evergreen forests commonly occupied by Great Hornbills.

METHODS

Roughly following the dimensions recommended by Kemp (1995), six nest boxes were constructed using 6 cm thick mahogany (*Swietenia macrophylla*) for the basic framework, the frame then covered with high quality marine plywood that was 3 cm in thickness. The internal nest chamber dimensions were 40 x 40 cm for both floor and roof (Figure 1). The back of the chamber was 80 cm high, the front only 78 cm to produce a 2 cm forward slope to the roof. The nest cavity opening was rectangular in shape measuring 15 cm wide by 35 cm tall. The lower margin of the opening was 20 cm from the floor, the upper margin 23 cm below the ceiling. The board forming the back of the box was 120 cm long, 10 cm of which extended above the roof and 25 cm extended below the compartment floor (thickness of cavity floor and roof contributed to the overall length of the back board). The board in front extended 20 cm below the compartment floor to serve as a tail support for the perched male bird.

The cavity opening was outlined with three layers of wood that narrowed progressively inward toward the opening (Figure 1). This provided added structure for perching during male visits to the nest. Three small ventilation holes were positioned under the roof on each side of the box. Upper and lower belts plus on top a belt with a hook were bolted to the nest box used to attach it to a tree. Each nest box weighed 45–50 kg. Four to six workers took 24 days to fabricate the six boxes, equaling four days per box.

Nest boxes were taken by vehicular transport to proximity of sites where they were to be positioned high in large trees. The remaining distance through difficult uneven forest terrain was accomplished employing tribal porters of Kadar ethnic lineage. One unit was in part transported on a bamboo raft.

Nest boxes (Figure 2) were ready for installation in November 2007 when two were installed, the other four being installed in December 2007. Activities around the boxes were visually monitored during frequent visits by observers in January 2008 and in the second nesting season by frequent monthly visits from October 2008 through March 2009.

RESULTS AND DISCUSSION

Four nest box locations were in the vicinity of the Sholayar Reservoir: (1) Ambalapara 10°19'11.3"N, 76°44'27.0"E; (2) Sholayar power house 10°17'57.6"N, 76°43'43.0"E; (3) Malakkapra 10°16'42.3"N, 76°50'50.8"E; (4) Thottapura 10°18'2.1"N, 76°45'26.4"E; the remaining two were inside the Vazhachal forest: (5) Vazhachal-1, 10°17'52.8"N,

76°35'10.7"E, and (6) Vazhachal-2, 10°18'00.0"N, 76°35'10.7"E (Table 1).

Study sites were monitored frequently during the 2008 and 2009 nesting seasons (Table 2). Trees with nest boxes were visited by Great Hornbills at three of the study areas in the first nesting season, January 2008, and even were seen at one site near the nest box. Preceding nesting in 2008, October–November, the hornbills were found near the nest box tree and more often in the nest box tree. The second nesting season of the study, January–March, showed an increasing activity in inspecting the nest boxes. Due to depletion of funds monitoring of nest boxes declined in 2009. A final search in March 2009 showed that none of the nest boxes had been occupied by nesting Great Hornbills.

There were several presentations at the Fifth International Hornbill Conference in Singapore, 22–25 March 2009, that described successful use of nest boxes by hornbill species both in captivity and in natural environments, but only one of these (Pasuwan et al. pers. comm.) included the Great Hornbill, wherein it was reported that it took three seasons in the wild to accept an artificial nest box. A number of hornbill species are known to raise young in nest boxes in captivity including the Great Hornbill (Kemp, 1995). Kemp (1995) also mentions studies (Buttiker, 1960; Rickert & Clinning,

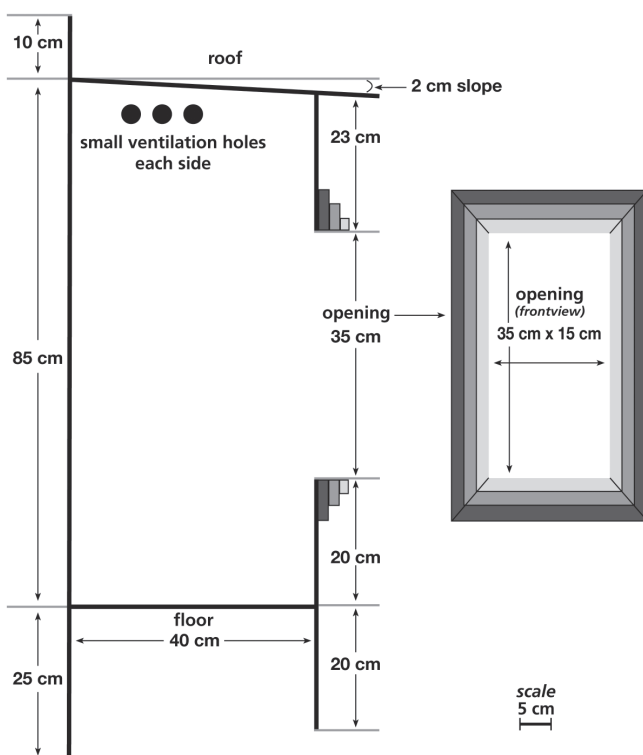


Fig. 1. Side view dimensions of the nest box for Great Hornbills also showing details of the framing around the nest box opening.



Fig. 2. Front view of finished nest box for the Great Hornbill with straps being installed.

Table 1. Some features characterizing the recipient tree in which Great Hornbill nest boxes were installed, including: elevation above sea level (Elev.), name of tree species, tree diameter breast high (dbh), recipient tree height (Tree ht.), height of nest box (Box ht.), and surrounding forest type.

Nest location	Elevation (m)	Recipient tree species	Dbh (cm)	Tree height (m)	Box height (m)	Forest type
Ambalapara	800	<i>Ficus beddomei</i>	188	45	35	Wet evergreen
Power house	505	<i>Vateria indica</i>	118	36	25	Degraded wet evergreen
Malakkapra	950	<i>Callophyllum polyanthum</i>	115	38	22	Edge of wet evergreen
Thottapura	879	<i>Ficus beddomei</i>	174	40	30	Edge of wet evergreen
Vazhachal-1	170	<i>Hopea parviflora</i>	124	42	28	Evergreen riparian
Vazhachal-2	200	<i>Lagerstroemia microcarpa</i>	99	38	27	Evergreen riparian

Table 2. Great Hornbills at the six study sites found inspecting nest boxes, or discovered in nest trees containing nest boxes, or noted visiting nest trees near a nest box tree (X's). Visits mostly by a pair of birds, a few times by several pairs or a single bird.

	Ambalapara	Power house	Malakkapra	Thottapura	Vazhachal-1	Vazhachal-2
January 2008						
Near nest tree			X			
In nest tree	X	X		X		
Near nest box					X	
October 2008						
In nest tree	X		X		X	X
November 2008						
Near nest tree			X		X	
In nest tree	X					
January–February 2009						
Near nest tree						
In nest tree		X				
Near nest box					X	
Inspecting nest box	X			X		
March 2009						
In nest tree					X	
Inspecting nest box	X			X		

1985) that resulted in successful use of nest boxes by hornbills erected in natural environments in the drier parts of Africa. A highly successful project was undertaken in Senegal in which African hornbills readily accepted nest boxes and produced young (Diop, 2007). However, Kinnaird & O'Brian (2007) emphasize that nest box studies have barely begun with Asian hornbills, such as the Great Hornbill, showing mixed results so far.

Great Hornbills nest fairly commonly in the Vazhachal Forest Division. The search for nests in natural cavities over the four nesting seasons 2004–2008 netted a total of 149 nests averaging ~37 per year, with a maximum of 57 nests found in the 2007–2008 season. In the present study, a Brown Palm Civet (*Paradoxurus jerdoni*) was found occupying a nest box in November 2008 at the Thottapura site, and a Malabar

Whistling Thrush (*Myophonus borsfieldii*) was seen in a nest box in the Power house site during the early 2009 season. A Malabar Pied Hornbill (*Anthracoceros coronatus*) was detected in the nest tree and also inspecting the nest box at the lowland site Vazhachal-2 in the 2009 nesting season.

We had recommendations that could have improved our project. Noting that there were significant visits by Great Hornbills in late 2008 prior to the 2009 nesting season (Table 2), it would have been expedient to finish constructing the nest boxes early enough to install them a few months earlier in 2007 rather than, as we did, in November and December. Also, in the future we would avoid installing the nest boxes on *Ficus* tree species (Table 1) to avoid undue disturbance from congregations of frugivorous birds attracted when the tree fruits. Another problem could have been concerning

the position of the nest box opening. In our box, the lower edge of the opening was 20 cm from the floor (Fig. 1). This measurement should be quite small, as shown by Kemp (1995), perhaps less than 20 cm, even as little as 10 cm, to easily allow the incubating female and later the small young to be fed through the slit opening and also to permit without difficulty the nest occupants to elevate their cloacae and defecate through the slit. In nest boxes where birds have bred in captivity the floor has been up to 30 cm below the entrance, but in three natural nests in Thailand the measurement was 0–7 cm (Kemp, 1995).

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