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Nesting site building on *Schima wallichii* and rearing behavior of Hornbills: A case study

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Abstract
Hornbills are enlisted in Indian Wildlife Protection Act (1972) under Schedule I. Few hornbill species are globally threatened. Hornbills present in the forests of Tripura are in severe pressure due to the various kinds of anthropogenic activities, such as: cutting of forests, habitat loss and traditional hunting etc. Hornbills can inhabit a variety of habitats. But the availability of suitable nesting site and fruiting trees are the two vital factors which affects hornbill ecology. Information about their diversified favorability of habitats and niches has potential importance, which might help to develop some conservation strategies for hornbills. *Schima wallichi*, locally known as Kanak is a suitable habitat for hornbills to complete the rearing of its chicks during the monsoon period by building up the nesting site in an architectural fashion.

Keywords: hornbill, *schima wallichi*, nesting-site, rearing behavior, kanak, tripura

1. Introduction
Hornbills are diverse group of birds occurred in Asia and Africa. Tripura is a hotspot regions of Indo-brumese extension where frugivorous hornbills are observed to be present. Hornbills can inhabit a variety of habitats. But the availability of suitable nesting site and fruiting trees (Poonswad *et al.* 2000) [14]. Are the two most important factors which affects hornbill ecology? The secondary cavities created by broken branches or those excavated by other birds can be utilized by hornbills for nesting. Few documentation suggested that hornbills choose elongated cavities relative to their body size (Poonswad, 1995; Datta and Rawat, 2004) [4, 123]. And also display high nest fidelity, often returning to the same nest site year after year (Kemp, 1979; Mudappa and Kannan, 1997) [8, 12]. Mostly, hornbills breed and nurture their nestlings in the excavated nesting sites on trees. But the anthropogenic activities like human interference are demolishing the breeding sites in a drastic manner. A continuous pressure lies on the existence of this avian species. Further, enhancement of the inter-specific and intra-specific competition among the wild bird communities for habitat and niche is another factor creating pressure on the survival of this population. Although various studies suggested about the nesting biology of different hornbill species (Poonswad *et al*. 1987, Poonswad 1995, Kinnaird and O'Brien, 1999) [13, 15, 9]. And to particular landscapes where they inhabits (Kannan, 1994; Mudappa and Kannan, 1997; Datta and Rawat, 2004) [4, 5, 12]. but still lacking of knowledge exists about their diversified favorability of habitats and niches. This information gap is particularly affecting the hornbill breeding and nesting in captive conditions. To develop proper conservation strategies for this near threatened birds, the exploration of its nesting behavior on the preferable plants required to be known. Therefore, an attempt was taken to report the choice of nest-site selection and the nesting biology of hornbill of Tripura.

2. Materials and Methods
2.1 Study site
The study was conducted at Aralia situated closely to Charilam under the Sepahijala district of Tripura, Northeast India (23º 38' 53.65'' N 91º 18' 18.49'' E). The area is surrounded by contiguous forests with diversified wild trees. Limited human habitation and water drainage systems were observed around adjacent areas of the study site (Fig.1).

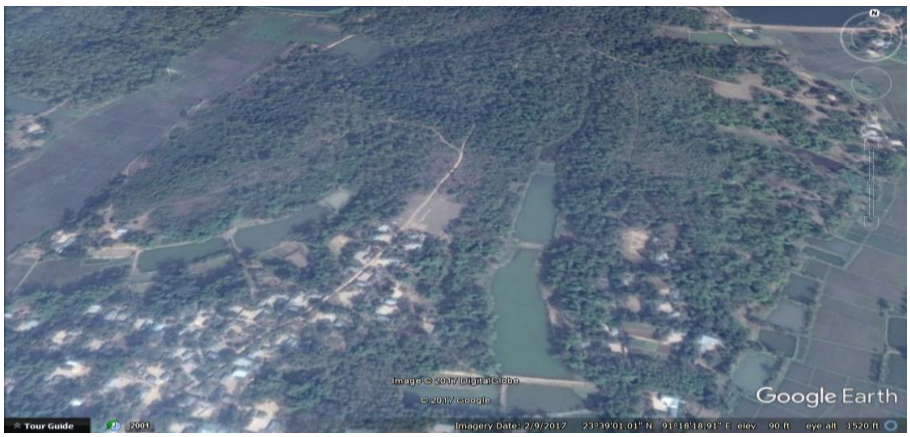

Fig 1: Area of the study around Aralia, Charilam, Tripura

2.2 Nesting site observation
The study was conducted from February, 2014 to October, 2014. Nest on *Schima wallichii*, locally named as Kanak tree were closely observed during the study period. The characteristics of nest building and rearing behavior of hornbills were recorded as photographs. Field was surveyed at every 5-7 days interval during the study period. Identification of active nest were done by following regurgitated seeds and fecal matters at the base of the tree where nesting-hole was present. Photographs were captured by the Canon ESO 1300D model camera at different time intervals.

3. Result and Discussion
3.1 Nesting periods
The nest entries of the hornbills were recorded in the month of March. Just before the pre-monsoon season their nesting behavior begins. During the monsoon season, from July to August, the chick emergences of the hornbills were observed.

3.2 Selection of nesting site and nest building mechanism:
Large sized *Schima wallichii* were observed to be selected by the hornbills for building up of the nests among the several other tree species located in the study area. This angiosperm comes under the order Ericales and the family Theaceae. The evergreen *Schima wallichii* mostly distributed over the northern India, Nepal, Bhutan, Chiana, Myanmar, Thailand, Laos and Vietnam. The tree height may vary within 10-20 meters. The bark of the Kanak is relatively softer and used for preparing housing utensils. The fruiting bodies of Kanak might be preferred by the hornbills and might be the reason of building up of its nesting site over the tree. Moreover, hornbills are known to range over distant places along with significant fluctuations over time and pace (Kemp, 1995; Keartumsom *et al.* 2011) [7], possibly to track patchily distributed fruiting trees (Kinnaird *et al.* 1996) [11]. Nest-holes were located in the upper and middle area of the canopy. Most of the nest holes were located on the main trunk or in primary sub-branches of the main trunk (Fig.2A&2B). The nest holes were comparatively wider in size and space for accommodating chicks of hornbills for rearing purposes. The nest building mechanism showed sealing of tree hole with muddy like substances mixing along with oral secretion of the bird, which acts as glue for shell formation around the tree hole. The openings of nest-cavity were superficially appeared elongated to oval in the shape (Fig.2C). The naives were used to feed regularly by the parent hornbills through the regurgitation process (Fig.2D). Hornbills can swallow and regurgitate large seeds in unharmed condition and thus helps in dispersal of several large-seeded plants in tropical forests from one area to another (Kinnaird and O'Brien, 2007) [10]. During monsoon period, raining causes dissociation of the opening of nest cavity, which results release of the matured hornbills in open environment. Hunting of Asian hornbills for body parts and consumption of meat resulted decline of this avian population drastically (Bennett *et al.* 1997; Datta, 2002; Aiyadurai *et al.* 2010) [2, 3, 1]. Therefore, this study might contribute to understand preference of their natural habitat on *Schima wallichii* and suitability of nesting site building mechanism for their hatchlings during the monsoon period. It may help in captive breeding of hornbills by providing their suitable habitat, niche and environment in order to develop conservation strategies for future time and generations.

Fig 2: Nesting site of Hornbill

4. Conclusion

Hornbill species are enlisted in Indian Wildlife Protection Act (1972) under Schedule I. Among them, 10 hornbill species are globally threatened. The forests of Tripura bear Hornbill which is in severe pressure due to the cutting of forests, habitat loss and traditional hunting etc. This avian population gradually becomes threatened and vulnerable day by day. Exploration of its natural preferences of habitat and nesting pattern has potential importance for implementation of conservation strategies.

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