Observation on an artificial nest of a Sri Lanka Grey Hornbill (*Ocyceros gingalensis*) in an urban setting

Damindu J.C. Wijewardana[1], Iresha I. Wijerathne[2,3], and Sriyani Wickramasinghe[4]

[1] *Faculty of Natural Science, Open University of Sri Lanka, Kandy, Sri Lanka*

[2] *Royal Botanical Gardens, Sri Lanka*

[3] *Guangxi Key Laboratory of Forest Ecology and Conservation, College of Forestry, Guangxi University, Daxuedonglu 100, Nanning 530004, China*

[4] *Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihintale, Sri Lanka*

***Corresponding author:** Damindu J. C. Wijewardana (daminduwij@gmail.com)*

Abstract

Ocyceros gingalensis *is a species endemic to Sri Lanka, having a vital ecological role in seed dispersal and maintaining rainforests. However, like many wildlife species, hornbills face threats from deforestation. Hence, introducing artificial nests would be one of the solutions for hornbills to overcome the problem of lack of mature, large trees with suitable cavities. This study was focused on an* Ocyceros gingalensis *nest in an urban setting. Although up until now, the only records of urban nests were of natural cavities, this particular nest was within an aluminum pot. This nest gave insight into how its diet varied compared to wild nests and a feasible alternative to current artificial nests used for conservation.*

Keywords: artificial nesting, feeding patterns, nesting habits, Suburban

Introduction

Sri Lanka is an equatorial island home to two species of hornbills—the Sri Lanka Grey Hornbill (*Ocyceros gingalensis*), which is endemic to the island, and the Malabar Pied Hornbill (*Anthracoceros coronatus*), a South Asia endemic. The Sri Lanka Grey Hornbill has a predominantly grey and white plumage. The male and female can be differentiated by the colour of their beaks. Malabar Pied Hornbill, on the other hand, has black and white feathers, a bright yellow bill and a prominent casque with a large black patch along the upper ridge and whitish throat patches. The male and female possess similar appearances; orbital skin is bluish-black on males and pinkish-white on females (Legge,1880). These birds are captivating and iconic with their striking appearance, unique breeding behaviour and ecological importance. According to Kotagama *et al.* (2011) and Wickramasinghe and Wijerathne (2022), the distribution patterns of the two species change with the disturbances in the ecosystems.

These birds are predominantly frugivorous, feeding on various fruits found in the dense rainforests (Kemp, 1995). They, hence, play a crucial role in seed dispersal, aiding in the regeneration and growth of forest ecosystems (Wijerathne *et al.*,

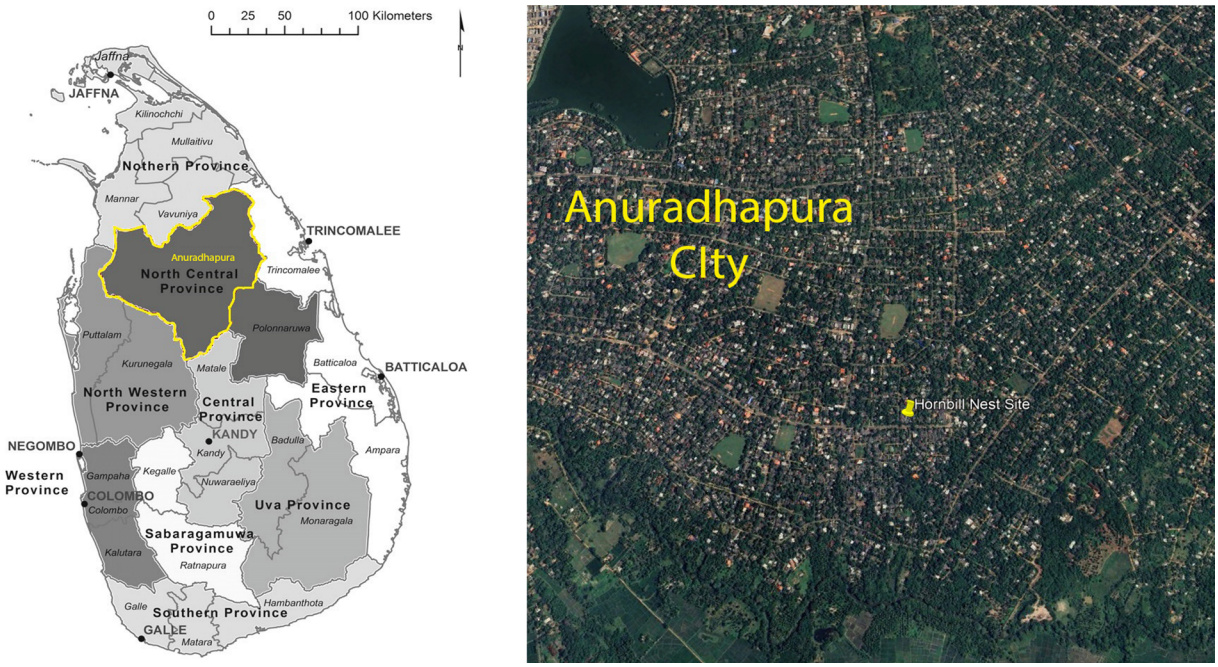

Fig. 1. Study site near the town of Anuradhapura, North Central Province, Sri Lanka.

2023). The female seals herself within a tree cavity using a mixture of mud and droppings, leaving only a narrow slit for the male to pass food to her and their chicks (Wijerathne and Wickramasinghe, 2018; 2019). This unique nesting strategy of hornbills ensures greater safety and survival of the chicks and females by providing protection. The feeding patterns also change during this period as their diet includes insects, small reptiles, birds, and whole snails in addition to figs to fulfill the protein requirement of the growing chicks (Wijerathne *et al.*, 2023).

The habitats of the Sri Lanka Grey Hornbill primarily encompass the rainforests, evergreen forests, and deciduous areas of Sri Lanka. These forests provide food sources and suitable nesting sites for the hornbills, allowing them to survive in their natural environment. Previous studies have found several nests in natural forests in Anuradhapura District, and have highlighted key tree species such as *Manilkara hexandra*, *Madhuca longifolia*, *Azadirachta indica*, *Melia azedarach* and *Mitragyna parvifolia* to be preferred hornbill nest trees (Wijerathne and Wickramasinghe, 2019). These trees are probably used due to their large girths (Wijerathne and Wickramasinghe, 2019). However, like many wildlife species, the hornbills face threats from deforestation, habitat loss, and unavailability of preferred food (Wickramasinghe and Wijerathne, 2022). Hence, introducing artificial nests would be one of the solutions for hornbills to overcome the problem of lack of large trees with suitable cavities. Here, we report our observations of an artificial nest within a suburban home garden in North Central Province in Sri Lanka, to determine the quality of this nest based on the survival and fledging of their offspring.

This nest was found in a home garden 1.5 km from Anuradhapura, North Central Province of Sri Lanka (Fig.1). The nest was around 1.8 meters above ground within an aluminum pot atop a mango tree. This pot was previously used by the homeowners to grow an ornamental plant. The pot was 40 cm in diameter at its widest (Fig. 2) and its opening was 13 cm wide.

Observations of the nest were for 5 months from March to July 2023 for the duration of

Fig. 2. The nest of a Sri Lanka Grey Hornbill made in a pot in a home garden.

the nesting period until chicks fledged. Observations were taken in 15-minute intervals from 0600 to 1800 hr on two random days in a week for a total of approximately 400 hours over the nesting period. Focal sampling (Altmann, 1974) was used for the data collection. Feeding patterns were observed, and fecal samples were collected twice a week using a seed trap placed 1.5 m below the nest for further information of diet. The seed trap consisted of a 2 × 2 m piece of fabric. The placement of the nest had an advantage to be observed from a distance. A hide 10 m from the nest tree was used for observations without disturbing the behavior of the nesting hornbills.

Both the male and female had searched for nesting sites in early March. The female visited this pot a few times, examined it and then started cleaning the cavity. Throughout this time, the male fed the female. The female laid a clutch of eggs in the last week of March 2023. The imprisoned female was frequently fed by the male during this time. The feeding frequency was 3.5 ± 0.6 (SD) times per hour. The incubation period lasted for approximately 30 days, and during this time, the male fed the female various kinds of fruits, insects, and occasionally snails and other food sources such as rice and string hoppers (local noodles). During the hours of 0600 hr to 1000 hr, the female was mostly fed fruits and insects. But by 1100 hr the food delivered appeared to completely shift to a mostly insect diet, with occasional fruits, snails and other foods like cooked rice and string hoppers being brought to feed the female (Fig. 3). Snail shells, bone-like particles and oil lamp wicks were also observed among the feces collected from the seed traps (Fig. 4).

By the end of April, the chicks had hatched, as noticed from the frequent chirping noises. During the start of May, the frequency of visits by the male increased compared to April (Fig. 5). The feed that was bought and the feeding frequency after the hatching of eggs was irregular throughout the day compared to during incubation but still consisted of the same items. The feed mainly consisted of insects with some fruits and nuts with an occasional snail shell.

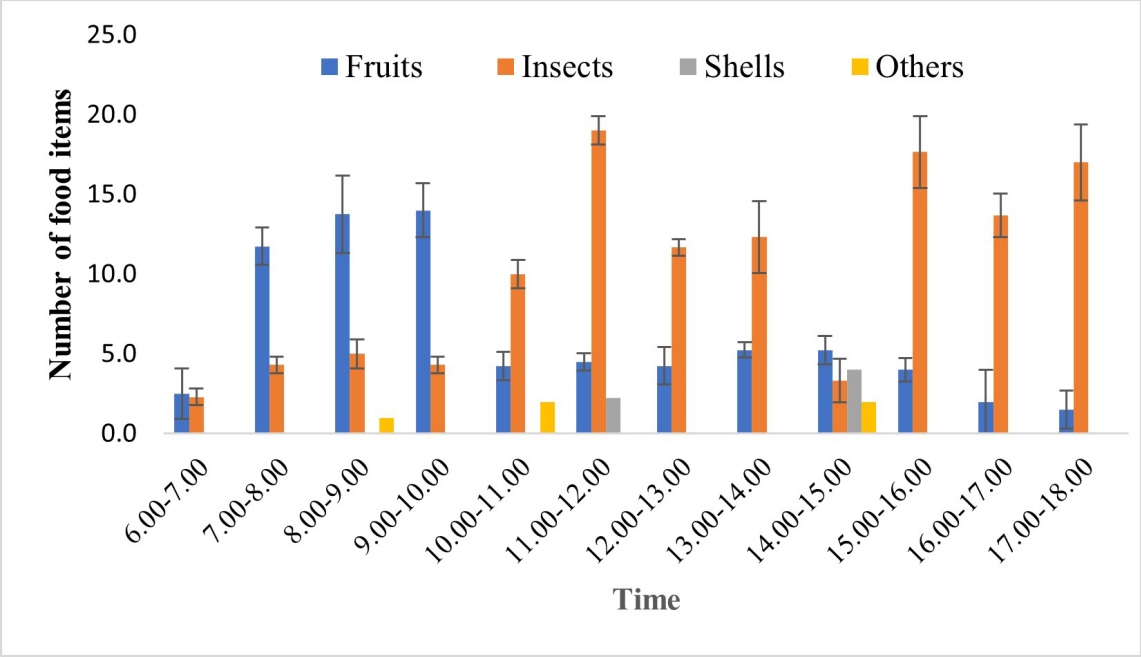

Fig. 3. Feeding frequency during incubation (error bars indicate standard deviation).

During this time, the male still brought rice and oil lamp wicks, but only one lizard was recorded throughout May (Fig. 4 and Fig. 5). By this time, the chicks had sufficiently grown to the point the nest was somewhat cramped.

By June 12th, the female broke through the nest seal with new, slightly darker feathers after moulting. During this time, it was observed that there were three chicks within the nest. The feeding frequency increased yet again. It was the highest ever recorded throughout the study (Fig. 6). During this time, roughly 91% of the diet consisted of insects with fruits and small reptiles. There were also occasions of rice and oil lamp wicks (Fig. 5). By the 20th of June, the female started feeding the chicks as well. We monitored the chicks during this time. By the end of June, the three chicks had well-developed plumage, but only one had developed its tail feathers (Fig. 7).

Fig. 4. Male carrying a snail shell (left), lizard being brought by the male (middle), Male carrying an oil lamp wick (right).

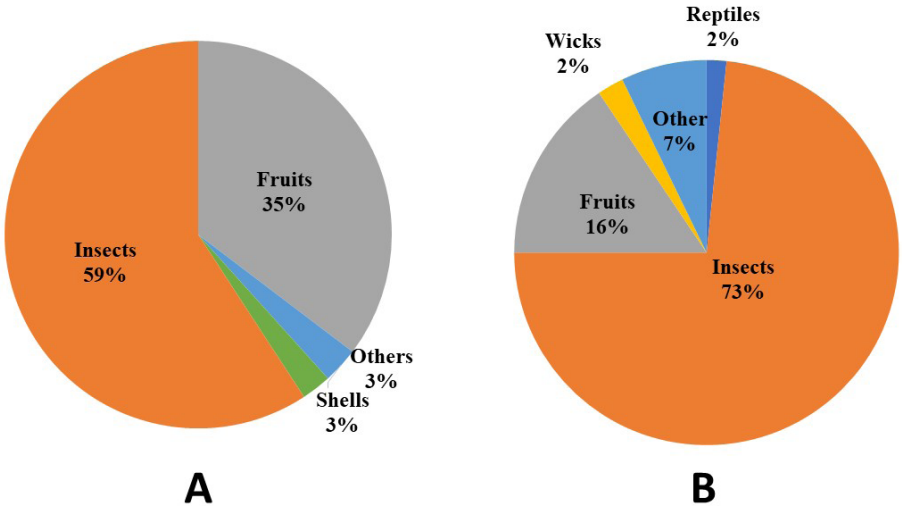

Fig. 5. Composition of diet of the Sri Lanka Grey Hornbill (A) During Incubation; (B) After the female left the nest.

On the first of July, the largest of the three chicks fledged the nest accompanied by both parents. The body size of the fledged chick was smaller than the adult with a developed plumage and somewhat developed tail feathers. The male returned occasionally to feed the other two chicks, but an overall number of visits to the nest was lower than before the first chick fledged. The second chick fledged on the 6th of July, while the third and last chick

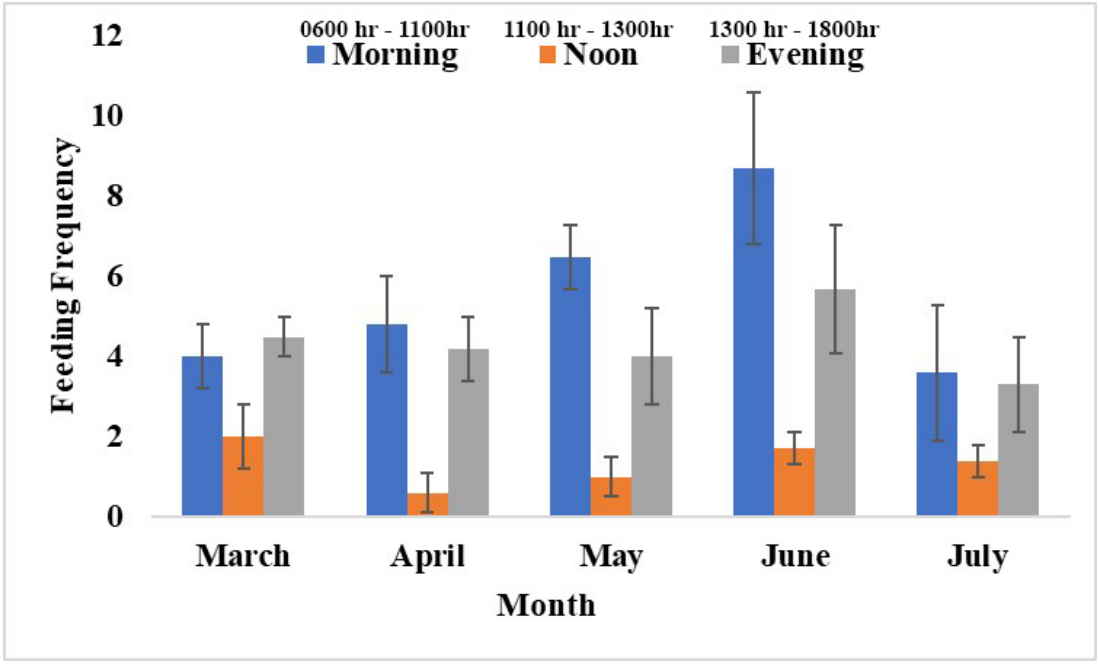

Fig. 6. Feeding frequency by the nesting Sri Lanka Grey Hornbill in different months throughout the nesting season.

Fig. 7. Most and least developed chicks beside each other (left). All three chicks with least developed in front and most developed at the back. Developed tail feathers seen on the largest chick (right).

fledged on the 9th of July. Overall, the feeding frequency during this time was at an all-time low (Fig. 6). However, there was an increase in fruits during this phase compared to the rest of the weeks. The nesting site was monitored for another two weeks, and the parents along with the three offspring were seen to be in good health as they passed by the old nest from time to time.

Discussion

In summary, this Sri Lanka Grey Hornbill nest took 110 days to complete incubation, hatching and fledging. This finding is like previous studies conducted in natural forest ecosystems by Wijerathne and Wickramasinghe (2018). The present study allows us to speculate that the diet composition in urban areas may differ from that of hornbills nesting in natural forests. In the wild, the majority of the diet consisted of multiple species of figs and fewer insects (Wijerathne *et al.*, 2023). But in the current study, this bird mainly fed on insects, which suggests a scarcity of figs in this urban setting. We also recorded the bird consuming a number of oil lamp wicks. Currently we do not have any reasoning behind this feeding behaviour. The need for required oils was also recorded in a study based on food availability and food selectivity of Sri Lanka Grey Hornbill conducted by Wijerathne *et al.* (2023). The maximum number of offspring found in natural nests so far was two, as found by Wijerathne and Wickramasinghe (2019), but in this nest, three male chicks successfully fledged. This may be due to its larger size of the pot compared to natural tree cavities, but further studies are needed.

References

Altmann J. 1974. Observational studies of behaviour: sampling methods. *Behaviour*, 49: 227–266.

Kemp AC. 1995. *The hornbills*. Oxford: Oxford University Press.

Kotagama SW, Kalathota C, *et al.*, 2011. Distributional Status of Hornbills in Sri Lanka, 1993-

2009. *Raffles Bulletin of Zoology Supplement* 24: 77–83.

Legge WV, 1880. A history of the birds of Ceylon. Republished 1993 by Tisara Prakasakayo, Dehiwala, Colombo. https://doi.org/10.5962/bhl.title.127685

Wickramasinghe S and Wijerathne I. 2022. A brief overview of the Malabar Pied Hornbill and Sri Lanka Grey Hornbill species in the Western Ghats and Sri Lanka. *WILDLANKA*, 10: 179–189.

Wickramasinghe S, Panduwawala P, *et al.*, 2018. Distribution and habitat ecology of Sri Lanka Grey Hornbill (*Ocycerous gingalensis*) in the Anuradhapura district, North Central province, Sri Lanka. *WILDLANKA*, 6: 1–7.

Wijerathne I, Panduwawala P, *et al.*, 2023. Food availability and food selectivity of Sri Lanka Grey Hornbill (*Ocyceros gingalensis*) Shaw, 1811 in Mihintale Sanctuary,Sri Lanka. *Journal of Threatened Taxa*, 15:1, DOI: https://doi.org/10.11609/jott.7249.15.1.22399-22409

Wijerathne I and Wickramasinghe S. 2019. Nest cavity characteristics and nesting success of Sri Lanka Grey Hornbill (*Ocycerous gingalensis*) in Mihintale Sanctuary, Sri Lanka. *International Journal of Environment and Biodiversity*, 10: 93 – 98

Wijerathne I and Wickramasinghe S. 2018. Behavioral pattern of endemic Sri Lanka Grey Hornbill (*Ocyceros gingalensis*) within the breeding and nonbreeding seasons. International Journal of Biodiversity, 2018: 1–7. https://doi.org/10.1155/2018/9509785

Damindu J.C. Wijewardana

Iresha I. Wijerathne

Sriyani Wickramasinghe