



Ecology of Hornbills on the Campus of Shri Shivaji College, Parbhani, Maharashtra

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Abstract

Hornbills play a pivotal role in tropical and subtropical ecosystems as primary seed dispersers and indicators of habitat integrity. This study investigates the ecology of hornbills on the campus of Shri Shivaji College, Parbhani, situated in the Marathwada region of Maharashtra. Employing a combination of systematic field observations, local ecological knowledge, and literature review, the research documents species presence, behavioral ecology, habitat preferences, and threats to hornbill populations. Emphasis is placed on the Indian Grey Hornbill, with particular attention to nesting patterns, feeding behavior, and conservation opportunities within urban green spaces. Findings suggest that semi-urban ecosystems like the college campus can support viable hornbill populations, provided that native tree cover is preserved and augmented. The study concludes with a call for community-led conservation and integration of hornbill ecology into local biodiversity management initiatives.

Keywords: Common Hornbill, Ecology, Shivaji College, Parbhani.

Introduction

Hornbills (Family: Bucerotidae) are a distinctive group of birds known for their striking bills, prominent casques, and intricate breeding behavior (Kemp, 1995; Poonswad & Kemp, 1993) ^[14, 22]. Globally, they inhabit the tropical and subtropical forests of Africa and Asia, with India harboring nine native species (Ali & Ripley, 1987; Rasmussen & Anderton, 2012) ^[1, 26]. Among these, the Indian Grey Hornbill (*Ocyrceros birostris*), Malabar Pied Hornbill (*Anthraceroceros coronatus*), and Great Hornbill (*Buceros bicornis*) are notable in the Indian context (Kumar *et al.*, 2011; Mudappa & Raman, 2009) ^[17, 20]. In Maharashtra, sightings are primarily restricted to forest patches and well-vegetated semi-urban regions (Sankaran, 2000; Kulkarni & Kanade, 2014) ^[27, 16]. Hornbills are ecologically significant due to their specialized diet of fruits, especially figs (*Ficus* spp.), and their function as long-distance seed dispersers. The survival of many forest trees is intrinsically linked to hornbill-mediated seed dispersal (Datta & Rawat, 2004) ^[9]. Yet, these birds face severe threats from habitat fragmentation, deforestation, and anthropogenic pressures. Interestingly, some hornbill species, particularly the Indian Grey Hornbill, have shown adaptive behaviors in response to urban expansion, exploiting remnant green spaces within cities (Kumar & Singh, 2019) ^[18]. This adaptability offers a unique opportunity to study hornbill ecology within modified landscapes such as educational campuses.

Study Area

Shri Shivaji College Campus Shri Shivaji College, located in Parbhani (19.2707° N, 76.7767° E), occupies approximately 20 acres and is characterized by diverse flora, including old-growth native trees and exotic ornamental species. Annual rainfall averages around 900 mm, with most precipitation occurring during the monsoon months of June to September. The campus is interspersed with tree-lined walkways, botanical gardens, dense groves, and open scrub patches. Notable tree species include *Tectona grandis*, *Saraca indica*, *Ficus religiosa*, *Azadirachta indica*, and *Tamarindus indica*. These trees provide crucial foraging and nesting habitats for hornbills and other avifauna. Presence of water tanks, low human disturbance zones, and a mosaic of microhabitats further enhance the ecological potential of the area.

Methodology

Data collection was carried out over a period of six months, from October 2022 to March 2023, incorporating both breeding and non-breeding seasons. Standard ornithological survey methods were employed, including line transects and point counts during early morning hours (Bibby *et al.*, 2000) ^[3]. Observations were recorded using standard Olympus binoculars and supported by digital cameras and field notebooks.

Tree species were identified with the help of regional floras (Naik, 1998) ^[21], and phenological patterns of key food trees were recorded weekly. Additionally, anecdotal evidence from campus staff, faculty, and students contributed valuable insights, especially regarding nest reuse and feeding activity.

Species Observed

Indian Grey Hornbill (*Ocyrceros birostris*) The Indian Grey Hornbill was the most frequently observed species, with sightings recorded on 82% of survey days. These birds were typically seen in pairs or small family groups, often foraging in *Tectona grandis*, *Azadirachta indica* and *Ficus religiosa* trees. Known for their resilience to habitat modification, they were regularly spotted near human habitations, even nesting in tree hollows close to classrooms and administrative buildings. Their call—a cackling series of harsh notes—was a common soundscape feature during dawn and dusk hours.

Habitat Utilization

Hornbills on campus exhibited strong preference for tall, mature trees with extensive canopy cover and high fruit yield. Species like *Tectona grandis*, *Ficus religiosa*, *Ficus benghalensis*, and *Tamarindus indica*, were heavily utilized for both foraging and roosting. Indian Grey Hornbills were observed engaging in leaf gleaning and insect foraging in addition to fruit consumption, indicating a level of dietary flexibility.

Large-crowned trees in quieter sections of the campus were favored for nesting. The presence of a diverse mix of native and non-native species contributed to habitat heterogeneity, enhancing resource availability throughout the year. Seasonal shifts in habitat use were also noted, with hornbills moving closer to water sources during dry months.

Feeding Ecology

Consistent with findings from other parts of India (Shanahan *et al.*, 2001; Corlett, 1998) ^[28, 6], hornbills on campus displayed a frugivorous diet supplemented by insects, lizards, and small mammals. Indian Grey Hornbills were observed feeding extensively on figs, tamarind, neem, and guava. Their feeding bouts often lasted several minutes, and seeds were either ingested and later defecated at distant locations or regurgitated, facilitating seed dispersal across the campus. Fruit availability was mapped across months, showing a peak in December-January, which coincided with increased hornbill activity. Phenological data from *Ficus* spp. suggested a near-continuous fruiting cycle, making them essential keystone species for hornbill survival.

Nesting Behavior

Hornbills are secondary cavity nesters, relying on pre-existing holes in large trees. During the study, four active nests of Indian Grey Hornbill were identified, all located in natural hollows within *Azadirachta indica* and *Tectona grandis*. Nest cavities were typically situated between 4–8 meters above ground and showed signs of previous use (e.g., smoothed edges, fecal stains).

Females were observed sealing themselves inside cavities with a mud-and-droppings mixture, leaving only a narrow slit for food transfer. Males actively foraged and delivered food items, exhibiting high levels of parental investment. In one instance, a male was recorded delivering figs and insects over 15 times within a three-hour window. Nest success was tentatively high, with fledging observed in three of four monitored nests.

Traditional knowledge among older staff members suggested that some of these trees had hosted hornbill nests for over a decade, underscoring the importance of preserving legacy trees. The reuse of nest sites aligns with previous findings (Datta & Rawat, 2004; Ramesh *et al.*, 2012) ^[9, 25].

Conservation Challenges

- Despite its relative ecological richness, the campus faces increasing pressures from infrastructural expansion, tree pruning, and noise pollution. The most significant threats include:
- Removal of old trees due to safety concerns.
- Decline in fig-bearing trees due to insufficient planting.
- Disturbance during the breeding season from campus events.
- Lack of awareness about hornbill nesting sites among maintenance staff.

Recommendations

- **Tree Plantation:** Expand green cover with species known to support hornbill ecology, such as *Ficus benghalensis*, and others.
- **Education and Outreach:** Incorporate hornbill awareness sessions into biodiversity club activities. Develop interpretive signage near key trees.
- **Monitoring:** Initiate long-term nest monitoring programs involving students, with guidance from ornithologists. Maintain a digital repository of nest sites.
- **Community Engagement:** Involve local schools, NGOs, and nature clubs in citizen science projects to map hornbill sightings across Parbhani.

Conclusion

The presence of hornbills on the Shri Shivaji College campus illustrates the vital role that urban and semi-urban green spaces can play in conserving avian biodiversity. With targeted habitat management, awareness initiatives, and participatory conservation, such spaces can serve as refuges for ecologically sensitive species. The Indian Grey Hornbill, in particular, emerges as a bioindicator for the health of green infrastructure in cities. Future conservation efforts must prioritize tree-based habitat continuity, community education, and rigorous ecological monitoring to ensure the persistence of hornbills in modified landscapes.

References

1. Ali S & Ripley SD. *Compact Handbook of the Birds of India and Pakistan*. Oxford University Press, 1987.
2. Aronson MFJ *et al.* A global analysis of the impacts of urbanization on bird and plant diversity. *Proceedings of the Royal Society B*, 2014, 281(1780).
3. Bibby C, Burgess N & Hill D. *Bird Census Techniques*. Academic Press, 2000.
4. Chaudhary A, Ramesh T & Sankar K. Diversity and nesting patterns of hornbills in Central India. *Indian Forester*. 2019; 145(3):205-210.
5. Chitale VS, Behera MD & Roy PS. Future of endemic flora of biodiversity hotspots in India. *Ecological Indicators*. 2014; 36:779–791.
6. Corlett RT. Frugivory and seed dispersal by vertebrates in the Oriental (Indomalayan) Region. *Biological Reviews*. 1998; 73(4):413–448.
7. Datta A. An ecological study of sympatric hornbills and fruiting patterns in a tropical forest in Arunachal Pradesh. *Ph.D. Thesis*, Saurashtra University, 2001.

8. Datta A. Hornbills and Ethno-ornithology of the Nyishi Tribe in Arunachal Pradesh. *Indian Birds*. 2003; 2(2):27-32.
9. Datta A & Rawat GS. Nest-site selection and nesting success of three hornbill species in Arunachal Pradesh. *Bird Conservation International*. 2004; 14(1):39–52.
10. Gokula V. Ecology of Indian Grey Hornbill in rural agro-ecosystems. *Journal of the Bombay Natural History Society*. 2001; 98(2):226–230.
11. Grimmett R, Inskipp C & Inskipp T. *Birds of the Indian Subcontinent*. Oxford University Press, 2011.
12. Jathar G & Rahmani AR. *Endemic Birds of India*. BNHS, Mumbai, 2006.
13. Kannan R & James DA. Fruiting phenology and the conservation of the Great Pied Hornbill. *Biotropica*. 1999; 31(2):167–177.
14. Kemp AC. *The Hornbills: Bucerotiformes*. Oxford University Press, 1995.
15. Kinnaird MF & O'Brien TG. *The Ecology and Conservation of Asian Hornbills*. University of Chicago Press, 2007.
16. Kulkarni DG & Kanade A. Status of hornbills in Maharashtra with notes on habitat and distribution. *Journal of the Bombay Natural History Society*. 2014; 111(2):101–107.
17. Kumar A, Balakrishnan P & Sivakumar K. Nest-site selection and nesting success of Great Hornbill in India. *Indian Forester*. 2011; 137(2):193–201.
18. Kumar M & Singh P. Urban hornbills: Adaptation and survival in Indian cities. *Urban Ecosystems*. 2019; 22(2):309–321.
19. Mudappa D & Kannan R. Nesting ecology of hornbills in the Western Ghats. *Journal of the Bombay Natural History Society*. 1997; 94(1):65–70.
20. Mudappa D & Raman TRS. Conservation status of hornbills in the Western Ghats, India. *Indian Birds*. 2009; 5(4):97–102.
21. Naik VN. *Flora of Marathwada*. Amrut Prakashan, 1998.
22. Poonswad P & Kemp A. Manual to the Conservation of Asian Hornbills. *Mahidol University and Hornbill Foundation of Thailand*, 1993.
23. Poonswad P, Kemp A & Strange M. *Hornbills of the World: A Photographic Guide*. Draco Publishing, 2005.
24. Raha A, Choudhury BC & Datta A. Illegal wildlife trade in hornbills: An emerging concern. *TRAFFIC Bulletin*. 2015; 27(1):5–12.
25. Ramesh T, Sankar K & Qureshi Q. Breeding biology of Indian Grey Hornbill in Central India. *Avian Biology Research*. 2012; 5(1):1–10.
26. Rasmussen PC & Anderton JC. *Birds of South Asia: The Ripley Guide*. Smithsonian Institution and Lynx Edicions, 2012, 1–2.
27. Sankaran R. Impact of habitat modification on hornbills and their nesting trees in the Western Ghats. *Salim Ali Centre for Ornithology and Natural History (SACON)*, 2000.
28. Shanahan M, So S, Compton S & Corlett R. Fig-eating by vertebrate frugivores. *Ecology*. 2001; 82(4):1082–1096.
29. Sharma A, Mishra C & Thakur P. Role of urban trees in supporting avian biodiversity. *Urban Forestry & Urban Greening*. 2020; 48:126514.
30. Sutherland WJ, Newton I & Green RE. *Bird Ecology and Conservation: A Handbook of Techniques*. Oxford University Press, 2004.
31. Trivedi P, Sinha S & Awasthi A. Conservation education and hornbill protection: A case study from Maharashtra. *Current Science*. 2020; 118(9):1432–1437.