

Chapter 4

From Trees to Survival: Conserving the Nesting Habitats of the Alexandrine Parakeet and Rose-ringed Parakeet

Subhalakshmi Rout and Sanjeet Kumar*

Ambika Prasad Research Foundation, Odisha, India

*Email-Id: sanjeetaprf@gmail.com



Licensed under a Creative Commons Attribution 4.0 International License

Abstract: The Alexandrine Parakeet (*Psittacula eupatria*), a large and ecologically significant parrot of South Asia and the rose-ringed parakeet (*Psittacula krameri*), a medium-sized parrot native to Africa and the Indian subcontinent, are increasingly threatened by habitat loss and the decline of suitable nesting sites. The present study investigates the nesting tree preferences of the parakeets, documenting tree species, structural characteristics, and habitat distribution of active nesting sites, as their survival is closely linked to the availability of suitable nesting trees. Current research documents 11 tree species, belonging to 8 families, utilized by the parakeets for nesting. Native forest trees such as *Shorea robusta*, *Ficus benghalensis* and *Mangifera indica* were the most frequently used, while cultivated species like *Cocos nucifera* and *Samanea saman* also provided nesting opportunities. The findings emphasize the species' reliance on mature, cavity-bearing trees and highlight the threats posed by habitat loss and urbanization. Nesting was observed predominantly in semi-urban, peri-urban and forest-edge habitats where old trees are retained, illuminating the critical role of remnant mature trees in human-modified landscapes. The study emphasized that conservation strategies must prioritize the protection of these trees, integrate biodiversity-sensitive planning into urban and rural landscapes and consider supplemental interventions such as artificial nest boxes. Protecting and managing nesting habitats is essential not only for the reproductive success of the parakeets but also for the broader preservation of avian biodiversity in changing ecosystems.

Keywords: Biodiversity, forest conservation, nesting habitat, tree cavities, tree species, urban ecology

Introduction

Trees are indispensable to the survival of cavity-nesting birds, providing essential sites for roosting, breeding and protection from predators and climatic extremes (Edworthy et al., 2012). For parakeets, nesting

opportunities are closely linked to the availability of mature trees capable of developing natural hollows (Ikin et al., 2014). The Alexandrine Parakeet (*Psittacula eupatria*) and the Rose-ringed Parakeet (*Psittacula krameri*) are representative species of tropical and subtropical landscapes whose reproductive success depends largely on such structurally complex trees (Lambert et al., 2009). However, accelerating urbanization, deforestation and the routine removal of old or hollow trees have led to a steady decline in suitable nesting habitats, posing serious challenges to their long-term survival (Gao et al., 2023). Both parakeet species exhibit a strong dependence on tree-based nesting habitats across forested, rural and urban environments (Hernández-Brito et al., 2021). Their ability to persist in human-dominated landscapes reflects a degree of ecological adaptability, yet this adaptability does not eliminate their reliance on mature trees (Arshad and Ilgar, 2022). The loss of nesting sites often results in increased competition, reduced breeding success and greater vulnerability to predators and environmental stressors (Hernández-Brito et al., 2021). Consequently, nesting habitat availability emerges as a key factor shaping population dynamics and distribution patterns of these birds (Fan et al., 2025). Conserving nesting habitats requires an understanding of the ecological role of trees beyond their value as timber or ornamental components of landscapes. Large, long-lived trees act as keystone structures within ecosystems, supporting not only parakeets but also a wide range of birds, mammals and insects (Yatsiuk, 2024). Protecting such trees contributes to broader ecosystem stability and biodiversity conservation, particularly in rapidly changing landscapes. The present study highlights the direct link between tree conservation and the persistence of the Alexandrine and Rose-ringed Parakeets. Effective conservation strategies must therefore integrate the protection of mature trees, sustainable urban and rural planning and community awareness. Safeguarding nesting habitats is not merely an avian conservation measure; it is a vital step toward maintaining ecological balance and ensuring the survival of these iconic parakeets in the face of ongoing environmental change.

Methodology

Field surveys were carried out from July 2025 to November 2025 in Cuttack, near the Mahanadi River areas, Odisha, India, to record nesting trees of the Alexandrine Parakeet and Rose-ringed Parakeet. Tree species were identified by the authors and the birds were identified using available literature (Grimmett et al., 2011; Kumar et al., 2022). Data from the recorded nesting trees were tabulated to assess species composition, habitat type,

and nesting frequency. The analysis focused on identifying patterns in tree selection and habitat preference.

Results and discussion

The field survey recorded a total of 11 tree species utilized by Alexandrine and rose-ringed parakeets for nesting, belonging to 8 botanical families (Table 1, Figure 3). Among the Moraceae family, *Ficus benghalensis* (Bara) and *Ficus religiosa* (Aswasta) were frequently observed as preferred nesting sites, highlighting the reliance of these parakeets on large, cavity-bearing trees. These trees were characterized by greater height and larger trunk diameters, providing structurally stable and spacious nesting sites suitable for large-bodied birds. Other native forest trees, such as *Shorea robusta*, *Mangifera indica* and *Madhuca longifolia*, also provided critical nesting opportunities. Fabaceae species, including *Dalbergia sissoo*, *Albizia lebbek* and *Samanea saman*, contributed significantly to nesting diversity, indicating the adaptability of parakeets in exploiting both native and planted trees. Cultivated and urban-associated species, such as *Cocos nucifera*, *Melia azedarach* and *Syzygium cumini*, were also utilized for nesting, demonstrating their ability to occupy human-modified habitats. The diversity of tree families and species indicates that while Alexandrine and Rose-ringed parakeets show a preference for mature, large-crowned trees, they are flexible in nesting site selection, provided the trees offer suitable cavities, stability and protection. Nest cavities were typically located at higher elevations on the tree trunk, which likely reduces predation risk and human disturbance. The repeated use of the same nesting trees across breeding seasons was observed, highlighting the long-term importance of specific trees as critical breeding resources. Spatially, nesting sites were distributed across forest edges, agricultural lands and peri-urban landscapes, with a notable concentration in areas where old trees had been retained. In contrast, areas dominated by young plantations or ornamental trees showed little to no nesting activity. This pattern showcases the significance of remnant mature trees even within modified habitats.

Table 1: Nesting trees of Alexandrine parakeet and Rose-ringed parakeet

Scientific name	Vernacular name	Family
<i>Albizia lebbek</i> (L.) Benth.	Sirisha	Fabaceae
<i>Cocos nucifera</i> L. (Figure 1)	Nadia	Arecaceae

<i>Dalbergia sissoo</i> Roxb. ex DC.	Sissu	Fabaceae
<i>Ficus benghalensis</i> L.	Bara	Moraceae
<i>Ficus religiosa</i> L.	Aswasta	Moraceae
<i>Madhuca longifolia</i> (L.) J.F.Macbr.	Mahula	Sapotaceae
<i>Mangifera indica</i> L.	Amba	Anacardiaceae
<i>Melia azedarach</i> L.	Mahanimba	Meliaceae
<i>Samanea saman</i> (Jacq.) Merr.	Chakunda	Fabaceae
<i>Shorea robusta</i> C.F.Gaertn. (Figure 2)	Sala	Dipterocarpaceae
<i>Syzygium cumini</i> (L.) Skeels	Jamun koli	Myrtaceae

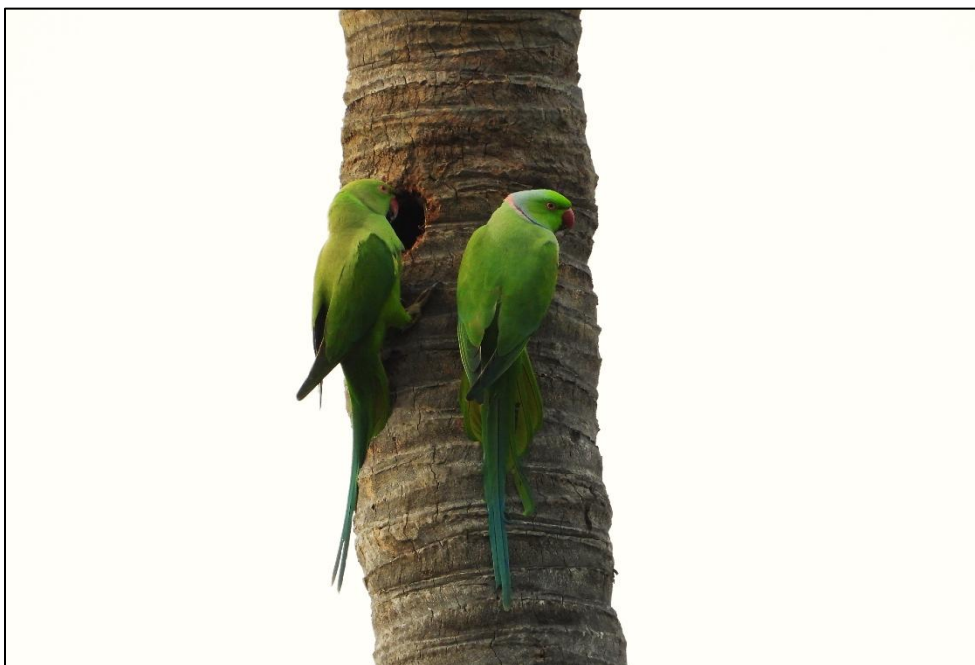


Figure 1: Nest of Rose-ringed parakeet on *Cocos nucifera*

The results of the present study clearly demonstrate that the availability of mature, cavity-bearing trees is a key determinant of nesting success for the parakeets. The species' reliance on specific tree characteristics explains its vulnerability to habitat alteration, particularly the removal of large, old trees. The results of the present study clearly demonstrate that the availability of mature, cavity-bearing trees is a key determinant of nesting

success for the parakeets. The species' reliance on specific tree characteristics explains its vulnerability to habitat alteration, particularly the removal of large, old trees.



Figure 2: Nest of Alexandrine parakeet on *Shorea robusta*

Such trees are increasingly scarce due to urban expansion, infrastructure development and changes in land-use practices, making nesting sites a limiting resource for parakeet populations. The dominance of native tree species in [Table 1](#) highlights their irreplaceable role in supporting avian biodiversity. Native trees tend to develop natural cavities through age-related decay processes, which are rarely replicated in fast-growing exotic or plantation species. This finding aligns with earlier studies on cavity-nesting birds, which emphasize the ecological value of old-growth trees as keystone structures in both forested and human-modified landscapes. The presence of nesting sites in urban and agricultural areas suggests a degree of adaptability in Alexandrine Parakeet and Rose-ringed Parakeet; however, this adaptability is constrained by the availability of suitable nesting substrates. While food resources may be abundant in such landscapes, the lack of appropriate nesting trees can result in increased competition, reduced breeding success and local population decline. Repeated use of the same nesting trees further indicates that loss of even a single tree can have disproportionate impacts on local breeding populations. The findings

emphasize that conservation of the parakeets cannot be achieved through species protection alone but must incorporate habitat-level interventions. Protecting mature native trees, regulating tree felling during breeding seasons and incorporating biodiversity-sensitive planning into urban and rural development are essential measures. Without targeted efforts to conserve nesting habitats, the long-term survival of the parakeets remains uncertain despite their apparent adaptability to human-dominated environments.

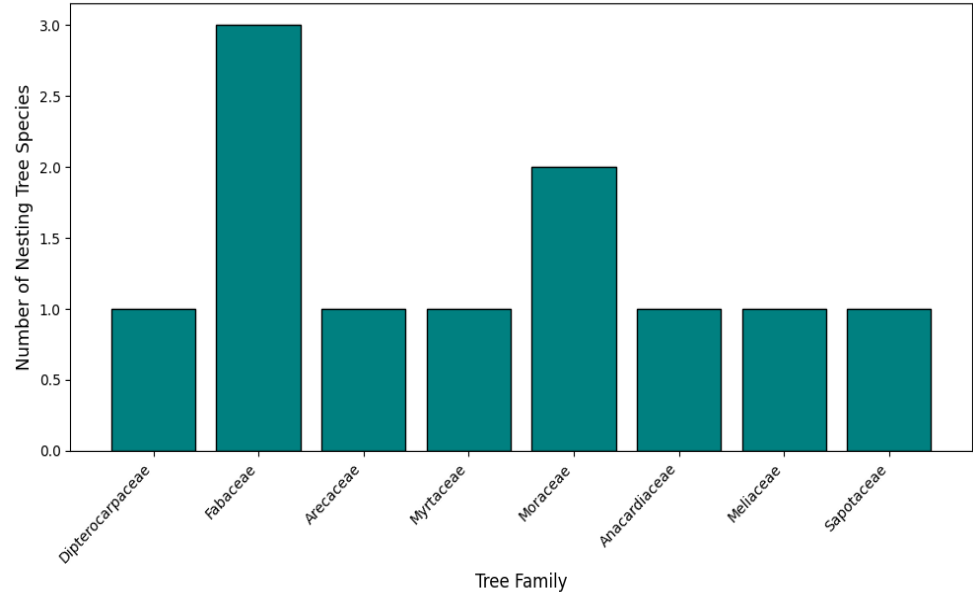


Figure 3: Family-wise depiction of nesting trees of parakeets

Conservation implications

The findings of this study emphasize that conservation of the Alexandrine Parakeet and Rose-ringed Parakeet is fundamentally linked to the protection of their nesting habitats, particularly mature, cavity-bearing trees. These trees represent a limited and non-renewable resource in human-dominated landscapes, as the formation of suitable nesting cavities requires several decades. Conservation strategies must therefore recognize old and senescent trees as critical ecological assets rather than expendable elements of urban and rural development. Urbanisation and infrastructure expansion pose the most immediate threats to nesting habitats by disproportionately targeting large trees. Municipal authorities and forest managers should integrate nesting-tree protection into development planning, tree-felling regulations and environmental impact assessments.

Retention of known nesting trees, establishment of buffer zones around active nesting sites during the breeding season and inclusion of native cavity-forming species in afforestation programmes can significantly enhance breeding opportunities for the parakeets. In landscapes where natural cavities are already scarce, the installation of species-specific artificial nest boxes may serve as a supplementary conservation measure. However, such interventions should complement, not replace, the conservation of natural nesting trees. Long-term monitoring of nest box occupancy and breeding success is essential to evaluate their effectiveness and to avoid unintended ecological consequences such as increased competition or disease transmission. Community participation is crucial for the success of nesting habitat conservation, especially in peri-urban and agricultural areas where many nesting trees persist outside protected forests. Awareness programmes highlighting the ecological importance of parakeets and their nesting trees can foster positive human-wildlife relationships and reduce disturbances during the breeding season. Collectively, these habitat-focused conservation actions can contribute not only to the survival of the parakeets but also to the preservation of urban and rural biodiversity at large.

Conclusion

The present study highlights the critical dependence of the Alexandrine parakeet and rose-ringed parakeet on mature, cavity-bearing trees for successful nesting and reproduction. The selective use of specific tree species and structural features highlights the importance of old-growth and native trees as indispensable components of the breeding ecology of the birds. These nesting habitats function not merely as physical structures but as key ecological resources that directly influence population stability and long-term survival. The findings also reveal that while the Alexandrine Parakeet and Rose-ringed Parakeet demonstrate a degree of adaptability by persisting in urban and human-modified landscapes, this resilience is strongly constrained by the availability of suitable nesting sites. The loss of even a few mature trees can significantly reduce breeding opportunities, leading to increased competition for cavities and heightened vulnerability to population decline. Thus, apparent abundance in altered habitats should not be mistaken for ecological security. Effective conservation of the birds must therefore prioritize habitat-based strategies that focus on the protection and management of nesting trees. Safeguarding mature native trees, integrating biodiversity considerations into land-use planning and promoting awareness about the ecological value of cavity-bearing trees are essential steps toward ensuring sustainable populations. Conservation of

these critical nesting habitats protects individual trees to secure the survival of the parakeet species and the broader ecological networks it represents.

References

- Arshad KT and Ilgar AL. (2022). Factors providing adaptations of rose-ringed parakeet (*Psittacula krameri*) in the urban ecosystems of the city of Baku. *Journal of Life Sciences and Biomedicine*. 4(77): 13-21.
- Edworthy AB, Wiebe KL and Martin K. (2012). Survival analysis of a critical resource for cavity-nesting communities: patterns of tree cavity longevity. *Ecological Applications*. 22(6): 1733-1742.
- Fan H, Guo W, Deng Y, Huang Z, Chen J and Ke D. (2025). Spatial Variation in nest-site selection and population dynamic of blue-throated bee-eater in a human-altered landscape: implications for conservation. *Ecology and Evolution*. 15(7): e71828. <https://doi.org/10.1002/ece3.71828>
- Gao X, Zhao B, Chen Z, Song W, Li Z and Wang X. (2023). The impact of urbanization on tree growth and xylem anatomical characteristics. *Biology*. 12(11): 1373. <https://doi.org/10.3390/biology12111373>
- Grimmett R, Inskipp C and Inskipp T. (2011). *Birds of the Indian Subcontinent*. Bloomsbury Publishing India Pvt. Ltd., London. .
- Hernández-Brito D, Tella JL, Blanco G and Carrete M. (2021). Nesting innovations allow population growth in an invasive population of rose-ringed parakeets. *Current Zoology*. 68(6): 617-626.
- Ikin K, Barton PS, Stirnemann IA, Stein JR, Michael D, Crane M, Okada S and Lindenmayer DB. (2014). Multi-scale associations between vegetation cover and woodland bird communities across a large agricultural region. *PloS One*. 9(5): e97029. <https://doi.org/10.1371/journal.pone.0097029>
- Kumar S, Mishra S, Mishra AK and Kumar SN. (2022). Floral Diversity of Koira and Barsuan Ranges of Bonai Forest Division, Odisha. Bonai Forest Division, Bonai, Sundargarh, Odisha and Ambika Prasad Research Foundation, Odisha, India.
- Lambert MS, Massei G, Bell J, Berry L, Haigh C and Cowan DP. (2009). Reproductive success of rose-ringed parakeets *Psittacula krameri* in a captive UK population. *Pest Management Science*. 65(11): 1215-1218.
- Yatsiuk Y. (2024). The multi-functional use of large tree cavities by arboreal vertebrates in a temperate broadleaved forest of Eastern Europe. *Ecology and Evolution*. 14(11): e70521. <https://doi.org/10.1002/ece3.70521>