

RESEARCH ARTICLE



Nesting of White-rumped Vulture (*Gyps bengalensis*) in Wayanad Wildlife Sanctuary, Kerala, India

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Abstract

Objectives: To study the breeding of critically endangered White-rumped vultures (*Gyps bengalensis*) in Wayanad Wildlife Sanctuary, which is the only remaining natural habitat of vultures in Kerala State. **Methods:** A direct on-foot survey and a structured questionnaire survey were conducted among the residents within the sanctuary and forest department staff to locate the nesting locations. **Findings:** Three nesting locations of White-rumped Vultures were identified in three different forest ranges in Wayanad Wildlife Sanctuary. Nest was seen in three tree species, *Adina cordifolia*, *Dalbergia latifolia*, and *Stereospermum tetragonum*. There is no significant change in the altitude of nest selection, all the nests were at an altitude of 820 m to 860 m. The nests were observed between 14 to 28 meters above the ground. The breeding success of this species in Wayanad Wildlife Sanctuary is 64.7 percent. **Novelty:** Wayanad Wildlife Sanctuary is the only place in Kerala State where White-rumped vultures are breeding. The study results show that the number of vulture nests in Wayanad Wildlife Sanctuary has declined, which needs immediate intervention for the conservation of the remaining breeding population of the critically endangered White-rumped Vulture population of Kerala State.

Keywords: White-rumped Vulture; Breeding; Nest site selection; Nesting trees; Breeding success

1 Introduction

Vultures play a crucial role as scavengers in maintaining ecological balance by consuming carcasses. They contribute to the breakdown of dead organisms, help regulate energy flow in higher trophic levels, support nutrient recycling, and reduce disease transmission among species by controlling unwanted mammalian scavengers⁽¹⁾. Despite their importance, vulture populations are rapidly declining worldwide, with some species nearing extinction⁽²⁾. This decline is attributed to factors such as the use of veterinary diclofenac⁽³⁾, food shortages⁽⁴⁾, unintentional poisoning, habitat loss⁽⁵⁾, and threats from domesticated animals such as stray dogs⁽⁶⁾. The loss of vultures disrupts ecological balance, increasing the risk of pollution and disease for wildlife, humans, and

livestock⁽⁷⁾.

Reproduction is essential for the survival of any species, but insufficient understanding of vulture breeding ecology and habitat needs can hinder effective management efforts. Vultures typically choose nesting sites based on various habitat factors, including climate, topography, perch availability, competition, food sources, and predation risk⁽⁸⁾. However, research on the nesting ecology of White-rumped Vultures is mostly confined to human-dominated areas⁽⁹⁾, leaving a gap in knowledge about their nesting preferences in forested environments. Understanding the characteristics of nesting habitats is essential for grasping the habitat requirements of vultures⁽¹⁰⁾ and gaining detailed insights into these factors is crucial for identifying potential sites for successful reintroduction of this declining species⁽¹¹⁾. Although White-rumped Vulture populations are rapidly declining, some breeding groups persist within their historical range and are vital for re-establishing the species in areas where it has diminished⁽⁹⁾. Thus, identifying remaining breeding sites and understanding their habitat needs are essential for developing effective conservation strategies. The Wayanad Wildlife Sanctuary in Kerala, a historical breeding site and the only known vulture breeding location in Kerala⁽¹²⁾, provides a unique opportunity to study nesting behaviors and associated environmental factors of the critically endangered White-rumped Vulture. This research aims to enhance future conservation efforts for the species in the area.

2 Study area

Wayanad Wildlife Sanctuary in Kerala constitutes a portion of the Western Ghats, which is regarded as one of the 36 global biodiversity hotspots. This sanctuary is an integral part of the Nilgiri Biosphere Reserve spanning 5520 km² and the most extensive continuous population of Royal Bengal Tigers globally⁽¹³⁾, thereby providing abundant carcasses for vultures. The forest ecosystem found in this region provides a habitat for a wide range of both floristic and faunal species. There are 50 species of mammals, 274 species of birds, 50 species of reptiles, 43 species of amphibians, and 94 species of fishes recorded from the sanctuary. Among invertebrates, 207 butterflies and 84 odonates have been reported in recent studies. Endemic fauna includes two species of mammals, six species of birds, eight species of amphibians, and 49 species of fish. Among the threatened category are nine species of mammals, six species of birds, and 16 species of fishes. Wayanad Wildlife Sanctuary accommodates a large number of particularly vulnerable tribal groups namely Kattunayakan. Other tribal communities such as Kuruma, Paniya, Adiya, Kurichiar, and Urali are sharing this landscape as an option for their livelihood.

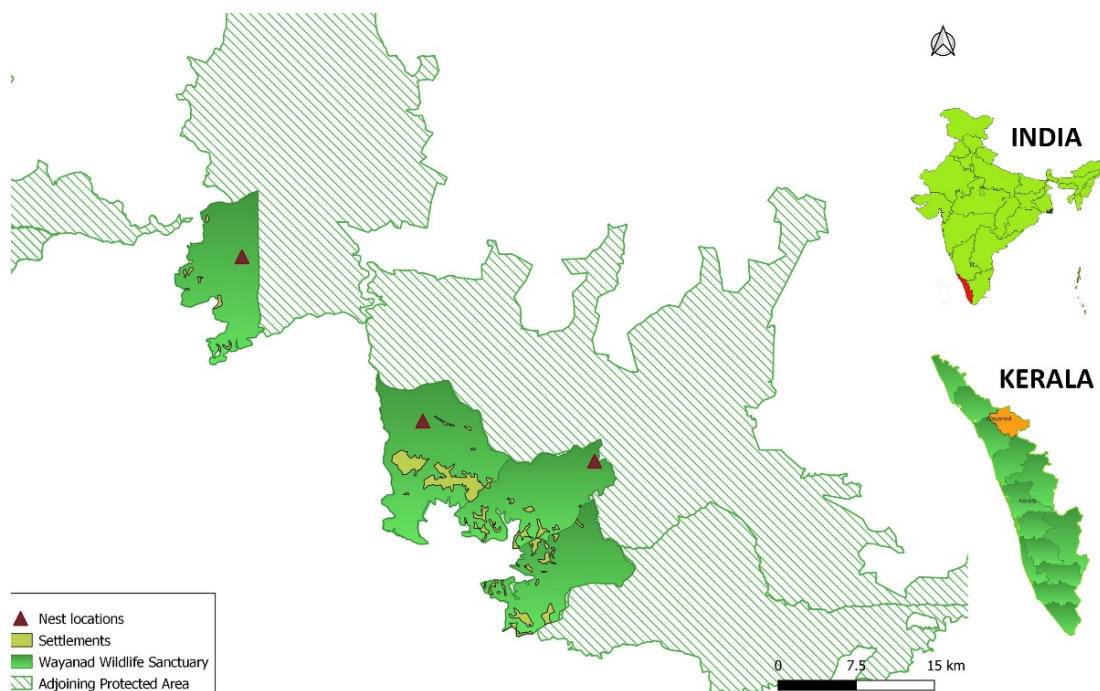


Fig 1. Map of study area showing nesting locations

3 Methodology

For the identification and systematic documentation of nests of White-rumped Vultures, both questionnaire survey and direct observation on foot were employed. Initially, a questionnaire survey was conducted among experienced forest department watchers, staff, Non-timber Forest Produce collectors (especially honey), and local tribal people residing in the sanctuary by showing photographs of vultures. In this regard, direct observation was made on foot survey in the sanctuary area to locate nests of White-rumped vultures. Habitat parameters like tree height, GBH of the nesting tree, choice of tree species, nest height, distance from the nearest road, waterbody, foraging ground, human habitation, and surrounding habitat were collected for each nest. Each nest was recorded on GPS (Model: GARMIN eTrex - 20). The height of nests and trees was recorded using a Nikon Forestry Pro range finder.

To study the breeding biology of White-rumped Vultures the identified nesting sites were marked and regularly visited once a week during the breeding season (September to April) for knowing the status of the nests, nestling, and breeding success. The sites, where nesting started were visited weekly in the morning (07h- 11h) and late in the evening (16h-18h) during the nesting period for monitoring of the nests. The nest from which the fledgling successfully flew out is considered a successful nest.

4 Results and Discussion

4.1 Nesting Locations and Nesting Trees

Data on active nesting sites were gathered through extensive field surveys in Wayanad Wildlife Sanctuary from 2018 to 2022, revealing three active nesting locations: Kaithallam in the Sulthan Bathery Range, Kazhukankolli in the Kurichiat Range, and Doddady in the Tholpetty Range. All these sites were situated deep within forested areas. Specifically, the Kaithallam nesting site is located along the Noolpuzha River. The nesting locations are about 150 – 380 meters from the nearest water body. Similarly, Anoop et al. (2020)⁽¹¹⁾ noted active nesting trees along the Moyar River and its tributaries in Tamil Nadu. While Kaithallam and Doddady are deep within the forest, Kazhukankolli is situated closer to the human settlement of the Kurichiat tribal village. There is historical evidence of White-rumped Vultures thriving near human habitation, such as in the Segur Plateau of Nilgiris, Tamil Nadu⁽¹⁴⁾, and about 400 breeding pairs were documented near human habitation in Delhi⁽¹⁵⁾. There is no significant difference observed in the altitude of the nesting locations. Kaithallam has an altitude of 825 meters, and Kazhukankolli and Doddady have 860 and 840 meters respectively.

The presence of large trees for nesting and roosting is essential for the survival of vultures, as these trees offer a strategic vantage point for finding food and help lower the chances of being preyed upon^{(8) (16)}. In 2018, a total of five nests were observed in the three nesting locations, one each at Doddadi and Kaithallam and three in Kazhukankolli, after 2018 no nests were found in Doddady and Kithallam. Our research identified 17 White-rumped Vulture nests across five different trees belonging to three species: *Adina cordifolia*, *Dalbergia latifolia*, and *Stereospermum tetragonum*, with girth at breast height (GBH) ranging from 230 to 390 centimeters, suggesting that White-rumped Vulture prefer larger trees for nesting. Similarly, Mital and Gosamy (2021)⁽¹⁷⁾ found White-rumped Vulture nests in Gujarat on *Azadirachta indica*, *Tamarindus indicus*, *Ficus religiosa*, and *Cocos nucifera*, while Samson & Ramakrishnan (2020)⁽¹⁴⁾ reported nests on *Terminalia arjuna* and *Spondias mangifera* in the Segur plateau of Tamil Nadu. Nests have also been observed on *Ficus* species in Myanmar⁽¹⁸⁾.

In our study area, nests were found between 14 and 28 meters above the ground, making them difficult for humans to access. The highest nest was recorded at 28 meters in Doddady, and the lowest was at 14 meters in Kaithallam. Previous studies show an average nesting height of 25-30 meters in the Segur plateau, Tamil Nadu⁽¹⁴⁾, and 13.6 meters in the Shan Highlands, Myanmar⁽¹⁹⁾. In our study, nesting trees ranged from 24 to 35 meters in height. Previous observations noted average nesting tree heights of 25.4 meters in Western Maharashtra⁽⁹⁾ and 26.7 meters in the Segur plateau, Tamil Nadu⁽¹⁴⁾. In 2018, strong winds felled a nesting tree in Kaithallam, and a nestling in Doddady was preyed upon by a Black eagle. As a result, no nests were found at these locations during the study period. Currently, Kazhukankolli is the only active site in the study area where White-rumped Vultures are still breeding. In 2019, the nestling from the Kazhukankolli nest fell from the nest due to the attack of honey bees. It is observed that parent birds are chasing away *Ratufa indica* which is coming near to the nest.

4.2 Breeding season and nesting success

White-rumped Vultures were observed to be bred from mid-September to May. Nest building starts between mid-September and October, with egg-laying occurring from late October to early November. Eggs typically hatch in late December, and fledglings leave the nest by April or May. During the study period, we recorded a total of 17 White-rumped Vulture nests, 11 of which were successful breeding, indicating a breeding success rate of 64.7 percent in the study area. This is lower compared to the 82 percent success rate reported at Keoladeo National Park in 1985, though there were no successful nests in 1997-98 and



Fig 2. Vulture nesting in *Adina cordifolia*



Fig 3. Vulture nest in *Dalbergia latifolia*

1998-99⁽²⁰⁾. Additionally, Samson & Ramakrishnan reported an 88 percent success rate for White-rumped Vulture nesting in the Segur plateau, Tamil Nadu⁽¹⁴⁾

Our observations showed a decline in the number of nests over the years: five nests in 2018, four in 2019, three in 2020, three in 2021, and two in 2022. This trend indicates a decrease in White-rumped Vulture breeding activity in the study area. This can be due to predation by black eagles, lack of food availability, etc. From 2003 to 2016, a maximum of 12 White-rumped Vulture nests per breeding season was recorded in the Wayanad Wildlife Sanctuary, with an average breeding success rate of 65 percent the lowest number of nests observed during that period was four in 2016-17⁽¹²⁾. The present study found the lowest number of nests during the 2021-22 breeding season, with only two nests. These findings highlight a troubling decline in White-rumped Vulture breeding numbers each year, underscoring the urgent need for conservation efforts to protect the critically endangered White-rumped Vulture population in the Wayanad Wildlife Sanctuary.

5 Conclusion

The White-rumped Vulture population in India has declined by almost 99.9 percent in the last 20 years⁽²¹⁾. The natural vulture population in Kerala state is primarily concentrated in Wayanad Wildlife Sanctuary. It is the only place in Kerala where White-rumped vultures are breeding. The current study found that White-rumped vultures are breeding in three different locations in Wayanad Wildlife Sanctuary. *Adina cordifolia*, *Dalbergia latifolia*, and *Stereospermum tetragonum* are the tree species in which White-rumped vultures are making nests. The breeding success of White-rumped vultures in the study area is 64.7 percent. The findings of the present study indicated that the number of nests in the study area is declining when compared to the previous studies, which needs immediate attention for the conservation of the critically endangered White-rumped Vulture population.

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