Aves Unveiled: A Study of Regional Bird Diversity of Dabguli Village of Uttara Kannada District, Karnataka, India

K. Nagaraj
Lecturer, Department of Chemistry, Poornaprajna College, Sangameshwarpete
Chikkamagaluru, Karnataka, India.
E-mail: nagarajchkrg123@gmail.com
ORCID- ID: 0009-0006-4180-5536

Area/Section: Applied Science.
Type of the Paper: Exploratory Research.
Number of Peer Reviews: Two.
Type of Review: Peer Reviewed as per |C|O|P|E| guidance.
Indexed in: OpenAIRE.
DOI: https://doi.org/10.5281/zenodo.14509615
Google Scholar Citation: PIJBAS

How to Cite this Paper:
Nagaraj, K. (2024). Aves Unveiled: A Study of Regional Bird Diversity of Dabguli Village of Uttara Kannada District, Karnataka, India. *Poornaprajna International Journal of Basic & Applied Sciences (PIJBAS)*, *1*(1), 90-101. DOI: https://doi.org/10.5281/zenodo.14509615

Poornaprajna International Journal of Basic & Applied Sciences (PIJBAS)
A Refereed International Journal of Poornaprajna Publication, India.

Received on: 05/12/2024
Published on: 18/12/2024

Aves Unveiled: A Study of Regional Bird Diversity of Dabguli Village of Uttara Kannada District, Karnataka, India

K. Nagaraj
Lecturer, Department of Chemistry, Poornaprajna College, Sangameshwarpete
Chikkamagaluru, Karnataka, India.
E-mail: nagarajchkrg123@gmail.com
ORCID- ID: 0009-0006-4180-5536

ABSTRACT

Purpose: *This checklist documents 25 bird species observed in Dabguli, Western Ghats, including several endemics, enriching regional biodiversity records. It enhances understanding of avian distribution and population dynamics, shaping conservation strategies and guiding habitat management. This baseline serves future ornithological research and long-term monitoring, supporting precise species identification and fostering taxonomic accuracy essential for avian studies. Educators, researchers, and enthusiasts will find it invaluable for promoting deeper engagement with the region's avian biodiversity.*

Methodology: *Field surveys were conducted in June and July 2024 during peak avian activity periods, from 6:00–9:00 am and 4:00–6:00 pm, using the Pollard Walk Method (PWM). Non-invasive techniques, including direct observation and high-resolution photography, ensured minimal disturbance to birds and habitats. Observations spanned diverse habitats, from agricultural areas to riparian zones, highlighting species' ecological roles and habitat preferences.*

Findings: *The study recorded a diverse assemblage of birds, with endemic species predominantly in undisturbed forests and generalists thriving in altered environments. This highlights the ecological wealth of the Western Ghats and emphasizes the importance of preserving heterogeneous habitats for biodiversity conservation.*

Originality/Value: *This research represents the first comprehensive documentation of birds in Dabguli, an under-explored region of the Western Ghats. The findings provide critical baseline data, offering insights into habitat preferences and ecological roles of recorded species. By minimizing disturbance through non-intrusive methods, this study contributes significantly to avian conservation and lays the groundwork for future research in similar biodiversity-rich but under-researched areas.*

Type of Paper: *Survey-based exploratory research.*

Keywords: Dabguli, Aves, Avian diversity, Western ghats, Habitat, Pollard Walk Method, Endemic, Biodiversity, Ecosystem, Hotspot

1. INTRODUCTION :

The village of Dabguli, situated in the biologically opulent Uttara Kannada district of Karnataka, forms an integral part of the ecologically paramount Western Ghats, an internationally acclaimed biodiversity sanctuary. This region harbours an extraordinary array of avifaunal diversity, with numerous species exhibiting endemism. The current investigation endeavours to meticulously document the avian species through rigorous, systematic field observations executed in June and July." The study underscores the indispensable ecological functions that birds perform, such as pollination, seed dispersal, and trophic regulation, serving as sentinel bioindicators of environmental integrity and ecosystem resilience, thereby accentuating the exigency of habitat conservation in this fragile biome.

Biodiversity encompasses the vast array and distinctiveness of biological entities arising from all origins, encompassing ground-dwelling, sea-based, and other water-dwelling ecosystems, as well as the intricate ecological networks in which these organisms are embedded. (Munje Avishkar et. al. (2022). [2]) In nations such as India, characterized by extraordinary biodiversity and dense human populations,

the preservation of wildlife is intricately linked to the prudent stewardship of production landscapes that extend beyond formal protected regions. (Munje Avishkar et. al. (2022). [2]). The Western Ghats, a prominent global biodiversity hotspot, harbours an abundant reservoir of biodiversity and stands as an ecologically significant region of the world, tracing its origin back to the ancient supercontinent of Gondwanaland (T. Pullaiah. (2024). [3]). The Western Ghats encompass merely 7% of India's total land area, with merely one-third of this expanse covered by forests. Nevertheless, it sustains 30% of the nation's biodiversity, rendering it a region of paramount importance for conservation efforts. (Mehta Prachi et. al. (2012). [4]).

The Western Ghats of India, an eminent tropical biodiversity hotspot in Asia, stands as a crucial bastion of ecological diversity, sheltering an unparalleled range of flora and fauna endemic to this region (Das Arundhati et. al. (2006). [5]). The Western Ghats' evergreen and moist deciduous forests harbor the most extensive avian community, hosting a vast array of bird species across these biodiverse habitats (Khot Mayura. (2016). [6]). Avian taxonomy has undergone significant flux over the past decade, with genetic research challenging the conventional classification frameworks, particularly among the diverse bird populations found in biodiversity hotspots like the Western Ghats (J Praveen. (2015. [7]). The Palghat Gap significantly shapes the distributional limits of numerous bird species, acting as a crucial biogeographical barrier within the Western Ghats' avifauna (Panigrahi madhumita et. al. (2018) [8]). The proliferation of growery, particularly of Caffeinated plants and eucalyptus trees, stands as a primary driver of woodland break-up across the Western Ghats, severely impacting its ecological continuity (Shankar Raman T R. (2006 [9]). Despite the Western Ghats population being geographically closer, this bird may have also originated from the migratory population of northeastern India ([10]). The varied blend of distinct habitat types creates an exceptional environment for numerous resident and migratory bird species, contributing to remarkable avian biodiversity (Baidya Pronoy & Bhagat Mandar. (2017). [11]). As deforestation rates keep increasing in various regions globally, the international conservation community faces the challenge of identifying strategies that not only curb deforestation but also support rural livelihoods while preserving biodiversity. (Barve Sahas & Warrier Rekha. (2013). [12]). Avian studies have a significant impact on recognizing the significance of landscapes for their conservation.

Ongoing monitoring provides deeper insights into their habitats (Rodrigues K. Maxim. Et. al. (2023). [13]). The swift rate and widespread scale of habitat degradation, coupled with the profound effects of climate change, pose significant challenges in monitoring shifts in species distribution across vast regions (Vijay Ramesh et. al. (2017). [14]). To ascertain the critical role of precise level spatial heterogeneity in the positioning of native vegetation patches on avian community makeup within a more expansive agricultural landscape, the analysis of the contribution of proximity to relict vegetation fragments on the assemblage of avian community inhabiting adjacent agroecosystems would be necessary (Ranganathan Jai. et. al. (2010). [15]). Birds serve as vital indicators of biodiversity shifts, reflecting ecological changes in their habitats. The Western Ghats, renowned for their rich biodiversity, are home to these avian jewels, symbolizing the region's ecological health and environmental integrity (M. Jhenkhar. et. al. (2016). [16]) (Byju. H. (2023). [17]). The forested landscapes of this region hold critical significance for numerous bird species, playing a pivotal role in sustaining their populations and ecological balance. (Abdar M.R. (2014). [18]).

After gaining independence, there was a significant shift in the region's landscape. Deforestation, hunting, and overgrazing became prevalent (Apte Sharad Datt et. al. (2018). [19]). The plant biodiversity in western ghats is remarkably abundant, as the favourable climatic conditions foster the development of a diverse array of habitats (Satose Varun et. al. (2018 [20]). India boasts an exceptionally high bird diversity compared to other nations. (MV Vincy et. al. (2015 [21]). Alterations in the vegetation of an ecosystem have a direct impact on its fauna (Christina Sharon et. al. (2023 [22]). Comprehending the patterns and factors influencing bird species composition and diversity beyond conservation networks is crucial for formulating effective landscape-level conservation strategies (Variar Athira S. et. al. (2021). [23]). The preservation action plan for the Western Ghats has sparked controversy due to the findings presented in reports by the By the expert ecological panel of the Western Ghats and senior-level authorities on the Western Ghats (Trivedi Shivam. (2023). [24]). Despite the availability of historical records, no attempts were made to systematically compile the avifauna (Jayson E. A. et. al. (2004). [25]). Food scarcity be instrumental in shaping the migratory behaviour of birds (Bopinwar Swati S. et. al. (2012). [26]). The Indian subcontinent is exceptionally abundant in birdlife (Ramchandra Abdar Mohan. (2013). [27]).

The aim of this study was to document the bird population diversity in the chosen site, Dabguli village which falls within the Western Ghats.

2. OBJECTIVES OF THE PAPER :

This paper seeks to identify and document the avian species present in the study area, with particular attention to endemic and threatened species, as well as to analyse their distribution patterns in relation to habitat types and environmental conditions. Additionally, the study aims to assess the relative abundance of each species observed during the survey. By interpreting these findings, the research seeks to inform conservation strategies and habitat management practices for avian biodiversity in the region. Furthermore, the study aims to raise awareness about the ecological importance of bird species among local communities and stakeholders, fostering a deeper interest in their conservation and protection.

3. REVIEW OF LITERATURE :

The reviewed studies highlight bird diversity and habitat associations in the western ghats. Research spans documenting species richness, impacts of plantations on avian communities, and conservation planning. Endemic and vulnerable species are emphasized, showcasing the region's ecological importance and the need for habitat prioritization and management (table 1).

Table 1: Summary of the review of literature as per important keywords used

S. No.	Area of Research	Focus and Outcome	Reference
1	Diversity of Aves	Bird diversity in Kodagu's Harangi River region, recording 44 species with notable conservation importance, including endangered, vulnerable, and endemic species.	Krishna M.P. (2018). [1].
2	Study of bird community structure	How habitat type and proximity to forests affect bird diversity in the Tillari landscape, showing that cashew plantations support bird diversity comparable to forests, while rubber plantations are less suitable.	Munje Avishkar et. al. (2022). [2].
3	Study of Avian species richness	Assessing bird species richness and conservation priorities in the Western Ghats of Maharashtra.	Mehta Prachi et. al. (2012). [4].
4	Conservation planning and habitat prioritization	Identifying high conservation value areas in the Western Ghats using a systematic approach and revealing gaps in current protected areas.	Das Arundhati et. al. (2006). [5].
5	Bird communities' assessment.	The role of habitat structure and floristics on bird communities in growery and rainforest fragments	Shankar Raman T R. (2006). [9].
6	Avian biodiversity	Documenting the avifauna of the Sharavathy landscape in the central Western Ghats	Barve Sahas & Warrier Rekha. (2013). [12].
7	Birds' biodiversity	Avifaunal diversity in the Mangalore University campus, recording 150 bird species.	Rodrigues K. Maxim. Et. al. (2023). [13].
8	Landscape-scale factors influencing bird species	Influence of intact forest proximity and remote sensing measures on bird community composition.	Ranganathan Jai. et. al. (2010). [15].
9	Bird diversity and ecosystem services	Seasonal bird population diversity and their ecosystem services in agricultural areas.	Abdar M.R. (2014). [18].

4. RESEARCH METHODS :

4.1 Study area:

The study area, Dabguli, is located in Uttara Kannada district, within the ecologically significant Western Ghats. This region is renowned for its lush landscapes, rich biodiversity, and cultural importance.

Dabguli spans 3900 hectares, with its topography featuring diverse landforms including agricultural areas, forests, and water bodies. The village lies at an elevation of 355.7 meters above mean sea level, and its geographical boundaries are marked by the coordinates 14.854337894890005N and 74.66088676057407E. The climate of Dabguli is characterized by substantial rainfall, with annual precipitation averaging 2599 mm. Temperature fluctuations range from a maximum of 40°C during the summer months to a minimum of 10°C in the winter. These environmental conditions make Dabguli a vital habitat for numerous species and contribute to the area's significance as a focal point for biodiversity and conservation efforts.

4.2 Methodology:

Field surveys were conducted during June- July 2024, targeting the peak activity periods of avian species. The observations were carried out twice daily: in the early morning from 6:00 am to 9:00 am and in the late afternoon from 4:00 pm to 6:30 pm. These timeframes were selected to correspond with the peak bird activity, particularly during the cooler hours of the day when most species are active in foraging and other behaviours.

The survey employed non-invasive observational techniques, with special care taken to minimize disturbances to the birds and their natural habitats. Direct observations were made using spotting scopes to document bird species without the use of traps, mist nets, or any methods that could harm or disturb the species. Additionally, high-resolution photographs were taken for precise identification and for creating a visual record of the species observed.

Bird species encountered during the survey were identified using reputable field guides and resources, such as “The SIBLEY Guide to Birds. National Audubon society, (2000)” (David Allen Sibley. (2000). [28]), “Birds of the Indian Subcontinent” by Richard Grimmett, Carol Inskipp, and Tim Inskipp (2011). (Richard Grimmett et. al. (2011). [29]) And “Checklist of birds of Karnala Bird Sanctuary, District Raigad, Maharashtra.” (Kasambe Raju et. al. (2015). [30]). These references provided detailed species descriptions, visual identification keys, and distribution data, facilitating accurate identification of birds based on morphological traits and habitat preferences.

No birds were captured or handled during the survey. The study adhered strictly to ethical guidelines, ensuring minimal interference with the local bird populations. Individuals that were challenging to identify in the field were either photographed for further analysis or carefully observed until enough data for accurate identification were obtained. Once the necessary observations were made, the birds were left undisturbed in their natural environment.

The gathered data were meticulously documented, with species recorded based on their habitat preferences, behaviour, and environmental conditions, contributing to a comprehensive understanding of the avian diversity within the study area (Table 2).

Table 2: List of Aves documented during the survey

Serial No.	Scientific name	Common name	Family
1	*Acridotheres tristis*	Common myna	Sturnidae
2	*Geokichla citrina*	Orange headed thrush	Turdidae
3	*Arachnothera longirostra*	Little spiderhunter	Nectariniidae
4	*Dicrurus aeneus*	Bronzed drongo	Dicruridae
5	*Chrysocolaptes socialis*	Malabar flameback	Picidae

6	*Pycnonoctus cafer*	Redvented Bulbul	Pycnonotidae
7	*Aegithina tiphia*	Common iora	Aegithinidae
8	*Merops orientalis*	Asian green bee-eater	Meropidae
9	*Copsychus saularis*	Oriental magpie-robin	Muscicapidae
10	*Pycnonotus jocosus*	Red-whiskered bulbul	Pycnonotidae
11	*Nycticorax nycticorax*	Black-crowned night heron	Ardeidae
12	*Ardeola grayii*	Indian pond heron	
13	*Pitta brachyura*	Indian pitta	Pittidae
14	*Parus xanthogenys*	Himalayan black-lored tit	Paridae
15	*Gracula religiosa*	Common hill myna	Sturnidae
16	*Pavo cristatus*	Indian peafowl	Phasianidae
17	*Psittacula calthrapae*	Layard's parakeet	Psittaculidae
18	*Rhopocichla atriceps*	Dark-fronted Babbler	Timaliidae
19	*Anthracoceros albirostris*	Oriental pied hornbill	Bucerotidae
20	*Microcarbo niger*	Little cormorant	Phalacrocoracidae
21	*Centropus sinensis*	Greater coucal	Cuculidae
22	*Leptocoma zeylonica* (Male)	Purple-rumped sunbird	Nectariniidae
23	*Leptocoma zeylonica* (Female)	Brown-rumped sunbird	
24	*Lanius cristatus Linnaeus*	Brown Shrike	Laniidae
25	*Harpactes fasciatus*	Malabar trogon	Trogonidae
26	*Pericrocotus flammeus* (female)	Scarlet minivet	Campephagidae
27	*Pericrocotus flammeus* (Male)	Orange minivet	

(Ia) **(Ib)** **(Ic)**

(Id) **(Ie)** **(If)**

(Ig) **(Ih)** **(Ii)**

Fig. 1: Ia) *Acridotheres tristis* If) *Pycnonoctus cafer*

Ib) *Geokichla citrina* Ig) *Aegithina tiphia*

Ic) *Arachnothera longirostra* Ih) *Merops orientalis*

Id) *Dicrurus aeneus* Ii) *Copsychus saularis*

(IIa)

(IIb)

(IIc)

(IId)

(IIe)

(IIf)

(IIg)

(IIh)

(IIi)

Fig. 2: IIa) *Pycnonotus jocosus*

IIb) *Nycticorax nycticorax*

IIc) *Pitta brachyura*

IId) *Ardeola grayii*

IIe) *Parus xanthogenys*

IIf) *Gracula religiosa*

IIg) *Pavo cristatus*

IIh) *Psittacula calthrapae*

IIi) *Rhopocichla atriceps*


(IIIa)


(IIIb)


(IIIc)


(IIId)


(IIIe)


(IIIf)


(IIIg)


(IIIh)


(IIIi)

Fig. 3 : IIIa) *Anthracoceros albirostris* IIIe) *Leptocoma zeylonica* (Male)

IIIb) *Microcarbo niger* IIIf) *Leptocoma zeylonica* (Female)

IIIc) *Lanius cristatus Linnaeus* IIIg) *Harpactes fasciatus*

IIId) *Centropus sinensis* IIIh) *Pericrocotus flammeus* (Female)

IIIi) *Pericrocotus flammeus* (Male)

7. RESULT AND DISCUSSION :

The field surveys in Dabguli documented 25 bird species across various habitats, showcasing the region's rich avian diversity. The species observed included both generalist species, such as *Acridotheres tristis* (Common Myna), and specialists like *Harpactes fasciatus* (Malabar Trogon), which

thrive in undisturbed forest areas. Endemic species were primarily located in forested zones, underscoring their dependence on intact ecosystems for survival. In contrast, adaptable species were found in both natural and human-modified landscapes.

Ecological roles of birds, such as seed dispersal and insect population regulation, were evident in this study. Species like the *Leptocoma zeylonica* (Purple-rumped Sunbird) were observed in areas with flowering plants, while predatory species like *Dicrurus aeneus* (Bronzed Drongo) were noted for controlling insect populations. These roles highlight the essential functions birds perform in sustaining ecosystem health and stability. Furthermore, the observed species composition reflects the overall health of the environment.

The study also emphasizes the need for continued conservation efforts. Habitat loss due to agricultural expansion and deforestation poses a significant threat to the bird populations in Dabguli, particularly for endemic and forest-dependent species. Conservation strategies should focus on protecting critical habitats, enhancing reforestation efforts, and implementing long-term monitoring programs to track changes in avian diversity over time. This research serves as a baseline for future biodiversity studies and calls for immediate actions to safeguard the region's avian richness.

8. SUGGESTIONS/RECOMMENDATIONS BASED ON ABOVE ANALYSIS :

To enhance the conservation of bird species, it is essential to implement protective measures and restoration initiatives in identified areas with high avian diversity. Establishing long-term monitoring programs will facilitate the assessment of changes in species diversity over time. Additionally, public education campaigns should be initiated to inform communities about the ecological significance of bird populations.

Encouraging collaboration among researchers, local governments, and conservation groups will improve data collection efforts. Promoting sustainable land-use practices and advocating for policies that prioritize the conservation of biodiversity will further bolster the protection of avian species.

9. CONCLUSION :

In conclusion, this study highlights the incredible avian diversity and ecological significance of the Aves in the Dabguli village of the Uttara Kannada District. The documentation of 25 distinct bird species, including several endemic and threatened varieties, underscores the area's importance as a critical habitat for avian life. Our findings emphasize the pivotal roles birds play in ecosystem functioning, including seed dispersal, flower fertilization and pest regulation, which are essential for maintaining ecological balance.

The observed patterns of species distribution and behaviour offer valuable insights into the health of avian populations and their responses to environmental changes. Given their sensitivity to habitat alteration and climate variability, birds serve as vital bioindicators for assessing ecosystem health. The increasing pressures of habitat loss, pollution, and climate change necessitate urgent conservation efforts to protect these species and their habitats.

As we compile a comprehensive checklist of Aves in this region, it is imperative to engage in sustained field research and data collection across diverse habitats. Collaborative initiatives among researchers, conservationists, and local communities will enhance our understanding of avian ecology and inform effective conservation strategies. By fostering a greater appreciation for these remarkable birds and their ecosystems, we can promote more robust efforts to safeguard their future and ensure the preservation of our natural heritage.

Acknowledgement:

I wish to express my sincere gratitude to Mr. Prasanna Bhat Dabguli, for generously sharing his remarkable avian photographs, which significantly contributed to the enhancement of the bird species checklist in this study. These photographs provided an important visual supplement to the research, further enriching the comprehensive nature of this work. This collaboration has added great value to the research.

REFERENCES :

[1] Krishna M. P. (2018). Diversity studies of birds in and around Harangi reservoir, Kodagu district, central Western Ghats. *International Journal of Creative Research Thoughts (IJCRT), 6*(2),1402-1410.

[2] Munje Avishkar et. al. (2022). Bird community structure in a mixed forest-production landscape in the northern Western Ghats, India. bioRxiv preprint doi: doi.org/10.1101/2022.04.04.486917, 1-24

[3] Biodiversity hotspot of the western ghats and Sri Lanka by T. Pullaiah. (2024).

[4] Mehta Prachi et. al. (2012). Identifying important areas for bird conservation in the western ghats region of Maharashtra, India. *Journal of the Bombay Natural History Society, 109*(1 & 2), 123-134.

[5] Das Arundhati et. al. (2006). Prioritisation of conservation areas in the Western Ghats, India. Biological conservation, 133(1), 16 – 31.

[6] Khot Mayura. (2016). A checklist of avifauna from Malgaon-Bagayat and Malvan towns of Sindhudurg District, Maharashtra, India. Journal of Threatened Taxa, 8(6), 8909–8918.

[7] Praveen, J. (2015). A checklist of birds of Kerala, India. *Journal of Threatened Taxa, 7*(13), 7983–8009.

[8] Panigrahi madhumita et. al. (2018). Status of birds in agasthyamalai hills, western ghats, kerala, India. *Journal of threatened taxa, 10*(1), 11166-11184.

[9] Shankar Raman T R. (2006). Effects of habitat structure and adjacent habitats on birds in tropical rainforest fragments and shaded plantations in the Western Ghats, India. *Biodiversity and Conservation, 15*(1), 1577–1607.

[10] J. Praveen. (2017). Great eared-nightjar *Lyncornis macrotis bourdilloni*: is it a southern western ghats endemic? *Journal of Bombay Natural History Society, 114*(1), 18-21.

[11] Baidya Pronoy & Bhagat Mandar. (2017). A checklist of the birds of Goa, India. *Indian BIRDS, 14*(1), 1-31.

[12] Barve Sahas & Warrier Rekha. (2013). Bird diversity of the Sharavathy landscape, Karnataka. *Indian Birds, 8*(3), 57-61.

[13] Rodrigues K. Maxim. Et. al. (2023). A checklist of avifauna of Mangalore University, Karnataka, India. *Journal of Threatened Taxa, 15*(1), 22430–22439

[14] Vijay Ramesh et. al. (2017). Citizen science-driven species distribution models estimate drastically smaller range sizes and higher threat levels for Western Ghats endemic birds. *Biological Conservation,* 205–221.

[15] Ranganathan Jai. et. al. (2010). Landscape-level effects on avifauna within tropical agriculture in the Western Ghats: Insights for management and conservation. *Biological Conservation*, 143 (12), 2909–2917.

[16] Jhenkhar.M. et. al. (2016). Bird diversity across different vegetation types in Kodagu, central western ghats, India. *International Journal of Zoology and Research (IJZR), 6*(3), 25-36

[17] Byju. H. (2023). A checklist of the avifauna of Samanatham tank, Madurai, Tamil Nadu, India. *Journal of Threatened Taxa, 15*(9), 23857–23869.

[18] Abdar M.R. (2014). Seasonal Diversity of Birds and Ecosystem Services in Agricultural Area of Western Ghats, Maharashtra State, India. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), 8*(1), 100-105.

[19] Apte Sharad Datt et. al. (2018). Checklist of the avifauna of Sagareshwar Wildlife Sanctuary, Maharashtra, India. *Journal of Threatened Taxa 10*(10), 12368–12375.

[20] Satose Varun et. al. (2018). Avian fauna of Amboli Ghat, Sindhudurg District, Maharashtra State, India. *Journal of Threatened Taxa, 10*(13): 12805–12816.

[21] Vincy, V. et. al. (2015). Checklist of riparian avifauna of Meenachil river basin, Kerala, South India. *International Journal of Fauna and Biological Studies, 3*(1), 55-57.

[22] Christina Sharon et. al. (2023). Birds as Indicators of Active Restoration in the Western Ghats. *Uttar Pradesh Journal of Zoology, 44*(7), 37-46.

[23] Variar Athira S. et. al. (2021). Resident birds show different patterns in species composition and functional diversity in differently managed coffee plantations in the Western Ghats, India. *Ornithological Science, 20*(1) 185–199.

[24] Trivedi Shivam. (2023). Identification, prioritization, and management of biodiversity hot specks: a case study of Western Ghats of Maharashtra, India. *Journal of Threatened Taxa, 15*(4), 22990–23004.

[25] Jayson E. A. et. al. (2004). Avifauna of Thrissur district, Kerala, India. *Zoo's print journal 20*(2), 1774-1783.

[26] Bopinwar Swati S. et. al. (2012). Diversity of birds in some ecological niches of Western Ghats in Maharashtra (India). *Research and Reviews in BioSciences, 6*(9), 231-239.

[27] Ramchandra Abdar Mohan. (2013). Diversity and richness of bird species in newly formed habitats of Chandoli National Park in Western Ghats, Maharashtra State, India. *Biodiversity Journal, 4* (1), 235-242.

[28] The SIBLEY Guide to Birds by David Allen Sibley. National Audubon Society, (2000).

[29] "Birds of the Indian Subcontinent" by Richard Grimmett, Carol Inskipp, and Tim Inskipp (2011).

[30] Kasambe Raju et. al. (2015). Checklist of birds of Karnala Bird Sanctuary, District Raigad, Maharashtra. *Newsletter for Birdwatchers, 55*(2), 1-5.

****