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Avian diversity of Thattekad bird sanctuary & Wayanad wildlife sanctuary of Kerala

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Abstract
The present study investigated avian diversity within Thattekad Bird Sanctuary and Wayanad Wildlife Sanctuary in Kerala, India. Field surveys were conducted during September-October 2024 using line transects and point count methodologies to document bird species across both protected areas. Our survey revealed 35 bird species in Thattekad and 50 species in Wayanad, with approximately 20% of recorded species in each sanctuary falling under threatened conservation categories (Near Threatened, Vulnerable, or Threatened). In Thattekad, 77.1% of species were classified as Least Concern, 5.7% as Near Threatened, 14.3% as Vulnerable, and 2.9% as Data Deficient. Similarly, Wayanad showed 74% of species as Least Concern, 10% as Near Threatened, 12% as Vulnerable, 2% as Threatened, and 2% as Data Deficient. Both sanctuaries shared several species including the Great Hornbill (*Buceros bicornis*), which is categorized as Vulnerable. The findings highlight the ecological significance of these protected areas within the Western Ghats biodiversity hotspot as crucial refuges for threatened avian species, supporting diverse ecological guilds including predators, pollinators, seed dispersers, and insectivores.

Keywords: Biodiversity, avian, guild, sanctuary, ecology, conservation

Introduction
Birds are valuable bioindicators because of their diversity, sensitivity to environmental changes, simplicity of monitoring, and involvement in various portions of the food chain (Larsen *et al*., 2010[12]; Maznikova *et al*., 2019) [13]. Monitoring bird populations can supply critical information regarding the health of ecosystems and serve as an early warning of potential environmental issues (Harisha & Hosetti., 2009[8]; Choudaj &Wankhade., 2021) [4]. They are comparatively simple to identify and detect, and census methods are both well-developed and cost-effective. Additionally, a significant number of skilled volunteers are willing to count birds (Koskimies, 1989) 11]; Venier and Pearce, 2004[18]; Gregory *et al*., 2005[5]; Pereira and Cooper, 2006) [15]. Variations in avian diversity and abundance are influenced by the climate, as well as other environmental factors such as vegetation cover and habitat heterogeneity (Anderle *et al*., 2023 [2]; Sultana *et al*., 2021) [16]. Consequently, they are significant indicators of ecosystem health. They are also relatively diverse and widespread, with approximately 10,000 species worldwide. Additionally, they are located at or near the apex of the food chain, which renders them susceptible to fluctuations at lower tropic levels (Koskimies, 1989[11]; Gregory *et al*., 2005) [5]. Grimmett and Inskipp (2007) [7] identified more than 9,000 avian species on a global scale. India is home to approximately 1,300 avian species and contributes more than 13% to the global bird population. Kerala is home to 353 avian species, as indicated by eBird data. In general, ecologists have observed that the impact of increasing urbanization on native bird species is detrimental (Aronson *et al*., 2014) [3]. Potentially functioning as the primary direct catalyst for species decline in the context of urbanization, the conversion of forest habitats into urban areas results in fragmentation and the loss of native bird habitats (Mckinney, 2006) [14]. The significance of birds in environmental assessments and conservation strategies necessitates an improved ecological understanding, as patterns of avian diversity and community structure are essential for conservation decision-making (Kati and Sekercioglu, 2006) [9].

A study was conducted in the Thattekad Bird Sanctuary and Wayanad Wildlife Sanctuary in Kerala, India, to aid local management in making informed decisions and to resolve specific areas of uncertainty.

Study area

Thattekad Bird Sanctuary: The Thattekkad Bird Sanctuary, the first bird sanctuary in Kerala, lies roughly 12 kilometres from Kothamangalam in Ernakulam district (Fig.1b). In Ernakulam District, this Sanctuary lies between 10° 7' and 11°N Latitude and 76° 40' and 76° 45' Longitude. The Malayalam term Thattekkad translates as "flat forest". The area where the sanctuary sits is a low-land forest lying between the branches of the longest river in Kerala, the Periyar River. Widely known as Dr. Salim Ali Bird Sanctuary, this sanctuary has been named for Dr. Salim Ali, the most renowned ornithologist in the nation. Dr. Salim suggested that the region be turned into a bird sanctuary since he believed it had promise after his 1933 survey at the foot of Western Ghats spread across 25 square kilometres. Rising from 20m to 528m above mean sea level, the topography is undulating. The sanctuary houses more than 270 bird species, 15 amphibian species, 34 mammal species, 47 fish species, and 30 reptile species. Sanctuary mostly comprises disturbed tropical evergreen, semi evergreen, moist deciduous forests, riparian forests, and reed (*Ochlandra travancoria*) brakes, diverse teak, mahogany and grassland plantations with rocky outcrop or flat grounds. Temperature ranges from 25^0-31^0C and the tropical, humid climate gets average rainfall (488 mm) during both south -West and North East monsoon.

Wayanad Wildlife Sanctuary: One of India's most ecologically significant regions, the Wayanad Wildlife Sanctuary is situated in the lush Western Ghats of Kerala (Fig.1a) and is renowned for its magnificent landscapes and diverse wildlife. In 1973, the sanctuary was established and is a crucial component of the Nilgiri Biosphere Reserve, a UNESCO World Heritage Site, spanning an extensive 344 square kilometres. Tropical moist deciduous and semi-evergreen forests are interspersed with teak, eucalyptus, bamboo, and other plantation species, forming a diverse array of flora in the sanctuary. The highest peak is Karottimala, with an altitude ranging from 650 to 1150 meters. Rainfall is particularly prevalent in the region, with both the southwest and northeast monsoons contributing to the precipitation. The maximum and minimum temperatures for the month are 31.2 °C and 15.0 °C, respectively.

Table 1: Summary data of study sites

Site	Coordinates	Altitude	Land use coverage	Microhabitat structure
Thattekad Bird Sanctuary, Ernakulam district	$10^0$08’30” N 76^{0}42’28” E	523 m	Protected area	Riparian forest, moist deciduous and evergreen forest, wetland and marshy area
Wayanad Wildlife Sanctuary, Wayanad district	76^{0}03’45” E 11^{0}56’45” N	650-1150 m	Protected area	Tropical moist deciduous forest, evergreen forest, bamboo brakes

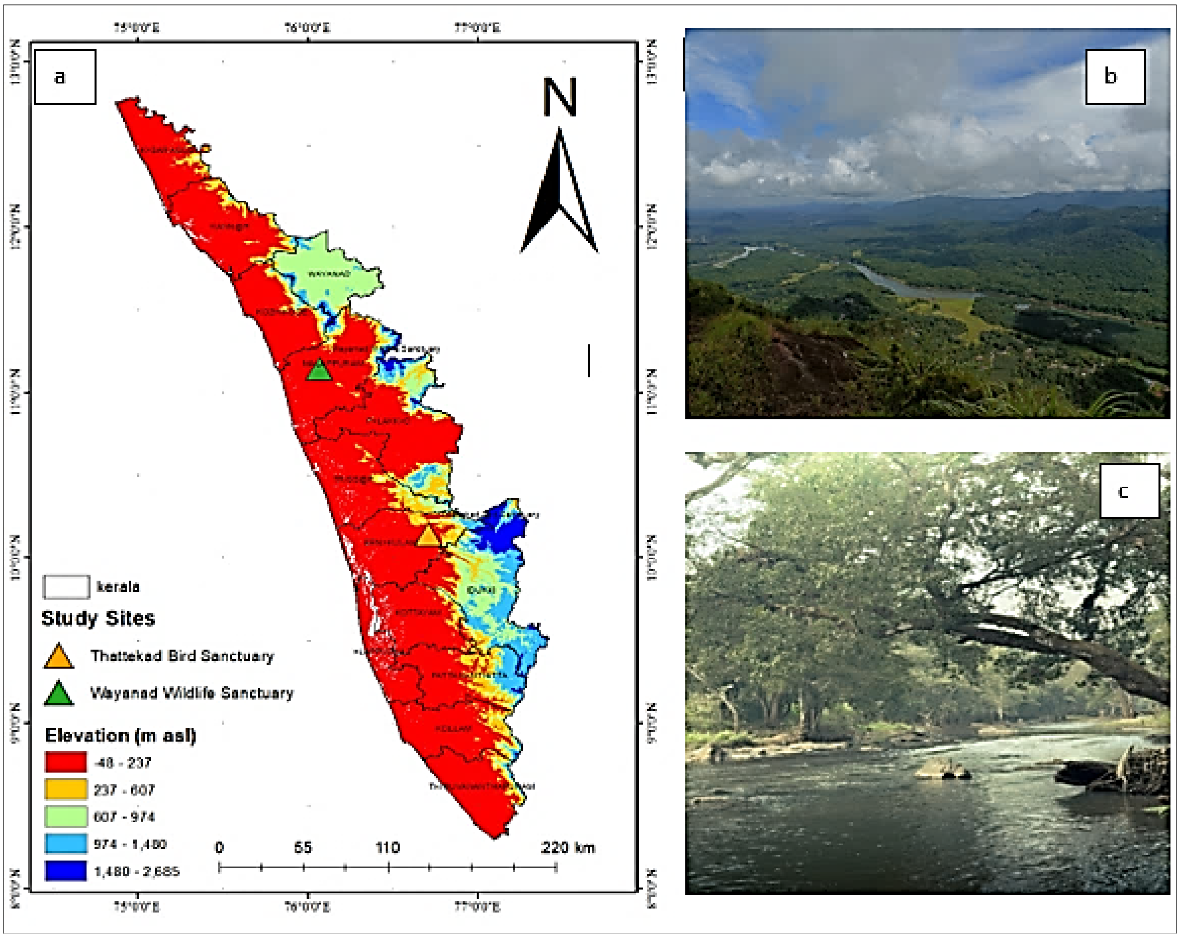

Fig 1: (a) Map (DEM) of Kerala with study sites (b) Landscape view of Thattekad Bird Sanctuar (c) Riparian forest of Wayanad bird sanctuary

Fig 2: Birds of Wayanad Wildlife Sanctuary (a) Brown fish Owl; (b) Malabar parakeet; (c) Ceylon frogmouth;(d) Malabar Grey Hornbill; (e) Lesser whistling Duck/Teal; (f) Malabar Trogon; (g) Asian Fairy Bluebird; (h) Great Indian Hornbill; (i) Indian Nightjar (Photos clicked by Anakha C Antu)

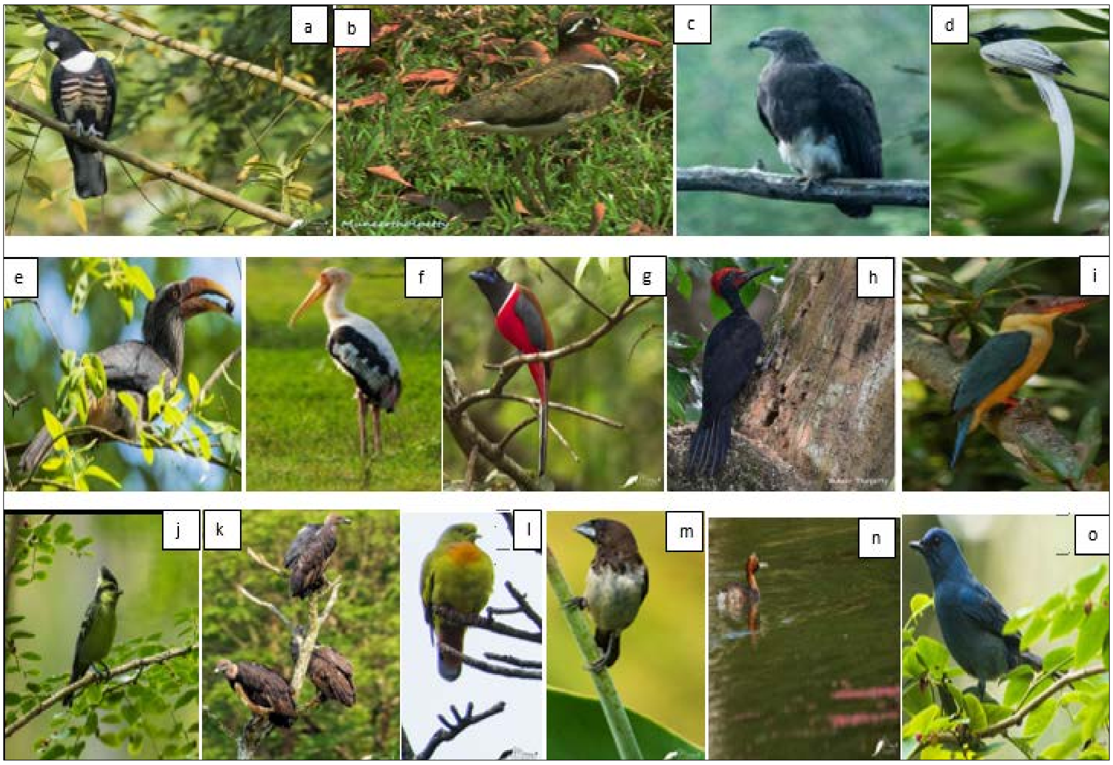

Fig 3: Birds of Thattekad Bird Sanctuary (a) Black baza; (b) Greater painted-snipe; (c) Lesser fish eagle; (d) Indian paradise flycatcher; (e) Malabar pied hornbill; (f) Painted stork; (g) Malabar trogon; (h) Tristram's woodpecker; (i) Stork-billed kingfisher; (j) Himalayan black lored tit; (k) Slender billed vulture; (l) Orange-breasted green pigeon; (m) Javan munia; (n) Little grebe; (o) Nilgiri flycatcher (Photos clicked by Muneer Tholpetty)

Data Collection Methods

Birds were investigated using the line transect technique on two kilometer-long fixed paths in Thattekkad Bird Sanctuary & Wayanad Wildlife Sanctuary. For a total of eight walks, every transect had two walks spread over a month. Examined using the same transect approach were migrating bird species. Following these routes and searching for flocks helped one to collect data. Two transect locations were randomly selected at each study site, around 200 meters apart to lower the likelihood of erroneously counting the same individual species many times during the survey. Each transect point's observations spanned 20 minutes and visibility varied from 10 to 100 meters on either side of the transect (Sutherland, 2006) [17]. The point count technique was also employed whereby observers stayed at one location for a set period of time noting the birds observed. The study was conducted during the migration season, which occurred from September-October, 2025. The observation was done by immediately seeing and calling birds on each side of the channel. Each morning between 0630 and 0900 and each afternoon/evening between 1400 and 1800, two hours were spent on each observation. Meticulously recorded were detailed statistics like the date, location, and number of birds counted. Olympus binoculars (10x50) and Ali and Ripley (1983) and Grimmett *et al*., (1998) [6] and Kazmierczak and Perlo (2000) [10] field guides were used to identify the birds. The vulnerability status of birds was classified based on the global level with the IUCN Red List of Species.

Results

The study documented a diverse avian community across both Thattekad Bird Sanctuary and Wayanad Wildlife Sanctuary in Kerala, with a total of 35 species recorded in Thattekad and 50 species in Wayanad. Analysis of the IUCN conservation status revealed that in Thattekkad, 27 species (77.1%) were classified as Least Concern, 2 species (5.7%) as Near Threatened, 5 species (14.3%) as Vulnerable, and 1 species (2.9%) as Data Deficient. The vulnerable species in Thattekkad Thattekad included the Flame Throated Bulbul (*Rubigul agularis*), Great Indian Hornbill (*Buceros bicornis*), Brown fish owl (*Ketupa zeylonensis*), Spot bellied eagle owl (*Ketupa nipalensis*), and Common hill myna (*Gracula religiosa*). In Wayanad Wildlife Sanctuary, the conservation status distribution showed 37 species (74%) classified as Least Concern, 5 species (10%) as Near Threatened, 6 species (12%) as Vulnerable, 1 species (2%) as Threatened, and 1 species (2%) as Data Deficient. Notable vulnerable species in Wayanad included Tristram's woodpecker (*Dryocopus javensis richardsi*), Great hornbill (*Buceros bicornis*), Woolly-necked stork (*Ciconia episcopus*), River tern (*Sterna aurantia*), Nilgiri flycatcher (*Eumyias albicaudatus*), Malabar grey hornbill (*Ocyceros griseus*), and lesser fish eagle (*Icthyophaga humilis*). Several species were common to both sanctuaries, including the Red-whiskered bulbul (*Pycnonotus jocosus*), Great hornbill (*Buceros bicornis*), River tern (*Sterna aurantia*), Red-wattled lapwing (*Vanellus indicus*), Jungle owlet (*Glaucidium radiatum*), and Malabar grey hornbill (*Ocyceros griseus*). Both sanctuaries showed approximately 20% of recorded species falling under threatened categories (Near Threatened, Vulnerable, or Threatened), highlighting their importance as refuges for birds facing conservation challenges. The avian communities in both sanctuaries represented diverse ecological guilds including predators, pollinators, seed dispersers, and insectivores, suggesting intact ecological processes supporting multiple tropic levels and ecosystem services. The data reveals that both sanctuaries share several common species, including the Red-whiskered bulbul (*Pycnonotus jocosus*), Great hornbill (*Buceros bicornis*), River tern (*Sterna aurantia*), Red-wattled lapwing (*Vanellus indicus*), Jungle owlet (*Glaucidium radiatum*), and Malabar grey hornbill (*Ocyceros griseus*).

Table 2: List of birds of Wayanad Wildlife Sanctuary

S. no	Common name	Scientific name	IUCN Category
1	Malabar Trongon	*Harpactes fasciatus*	*NT*
2	Flame Throated Bulbul	*Rubigula gularis*	*V*
3	Yellow Browned Bulbul	*Acritillas indica*	*LC*
4	Red Whiskered Bulbul	*Pycnonotus jocosus*	LC
5	Asian Paradise Flycatcher	*Terpsiphone paradisi*	LC
6	Celyon Frogmouth	*Batrachostomus moniliger*	*LC*
7	Indian Nightjar	*Caprimulgus asiaticus*	*LC*
8	Malabar Grey Hornbill	*Ocyceros griseus*	*NT*
9	Great Indian Hornbill	*Buceros bicornis*	V
10	Lesser whistling Duck/Teal	*Dendrocygna javanica*	*LC*
11	Asian Fairy Bluebird	*Irena puella*	*LC*
12	Asian openbill	*Anastomus oscitans*	LC
13	Oriental Magpie Robin	*Copsychus saularis*	*LC*
14	Lotens sunbird	*Cinnyris lotenius*	*LC*
15	Greater Racket Tailed Drongo	*(Dicrurus paradiseus*	LC
16	Grey Wagtail	*(Motacilla cinerea*	LC
17	River Tern	*Sterna aurantia*	LC
18	White bellied Treepie	*Dendrocitta leucogastra*	LC
19	Large Woodshrike	*Tephrodornis virgatus*	LC
20	Red Wattled-Lapwing	*Vanellus indicus*	*LC*
21	White cheeked Barbet	*Psilopogon viridis*	LC
22	Malabar parakeet	*Psittacula columboides*	*LC*
23	Great Hanging parrot	*Loriculus stigmatus*	*LC*
24	Heart Spotted woodpecker	*Hemicircus canente*	*LC*
25	White bellied woodpecker	*Dryocopus javensis*	LC
26	Black rumpedflameback	*Dinopium benghalense*	LC
27	Black naped oriole	*Oriolus chinensis*	LC

28	Jungle owlet	*Glaucidium radiatum*	LC
29	Itombwe owl	*Tyto prigoginei*	DD
30	Brown fish owl	*Ketupa zeylonensis*	V
31	Crested hawk eagle	*Nisaetus cirrhatus*	LC
32	Spot bellied eagle owl	*Ketup anipalensis*	V
33	Jungle babbler	*Argya striata*	LC
34	Motted wood owl	*Strix ocellata*	*LC*
35	Common hill myna	*Gracula religiosa*	*V*

Table 3: List of birds of Thattekad Bird Sanctuary

S. no	Common name	Scientific name	IUCN status
1	Eastern crowned warbler	*Phylloscopus coronatus*	LC
2	Red-whiskered bulbul	*Pycnonotus jocosus*	LC
3	Paddyfield pipit	*Anthus rufulus*	*LC*
4	Myna	*Acridotheres tristis*	LC
5	Tristram's woodpecker	*Dryocopus javensis richardsi*	*V*
6	Little spiderhunter	*Arachnothera longirostra*	LC
7	Pied bush chat	*Saxicola caprata*	*LC*
8	Brown rock chat	*Oenanthe fusca*	LC
9	European bee-eater	*Merops apiaster*	LC
10	Crested serpent eagle	*Spilornis cheela*	LC
11	River tern	*Sterna aurantia*	V
12	Grey imperial pigeon	*Ducula pickeringii*	NT
13	Great hornbill	*Buceros bicornis*	V
14	Woolly-necked stork	*Ciconia episcopus*	*V*
15	Red-wattled lapwing	*Vanellus indicus*	*LC*
16	Malabar pied hornbill	*Anthracoceros coronatus*	*NT*
17	Stork billed Kingfisher	*Pelargopsis capensis*	*LC*
18	Blue-bearded bee-eater	*Nyctyornis athertoni*	*LC*
19	Crimson-fronted barbet	*Psilopogon rubricapillus*	LC
20	Chestnut-tailed starling	*Sturnia malabarica*	LC
21	Sri Lanka white-eye	*Zosterops ceylonensis*	*T*
22	Shikra	*Tachyspiza badia*	*LC*
23	Bull-headed shrike	*Lanius bucephalus*	LC
24	Yellow-crowned woodpecker	*Leiopicus mahrattensis*	*LC*
25	Malabar trogon	*Harpactes fasciatus*	*T*
26	Golden eagle	*Aquila chrysaetos*	LC
27	Jungle owlet	*Glaucidium radiatum*	*LC*
28	Plum-headed parakeet	*Psittacula cyanocephala*	LC
29	Asian green bee-eater	*Merops orientalis*	LC
30	Fiery minivet	*Pericrocotus igneus*	LC
31	Himalayan black-lored tit	*Machlolophus xanthogenys*	LC
32	Nilgiri flycatcher	*Eumyias albicaudatus*	V
33	Blue-capped rock thrush	*Monticola cinclorhyncha*	LC
34	European red-rumped swallow	*Cecropis rufula*	LC
35	Peafowl	*Pavo cristatus*	*LC*
36	Javan munia	*Lonchura leucogastroides*	*LC*
37	Orange-breasted green pigeon	*Treron bicinctus*	*NT*
38	Yellow-footed green pigeon	*Treron phoenicopterus*	LC
39	Black baza	*Aviceda leuphotes*	LC
40	Little grebe	*Tachybaptus ruficollis*	*LC*
41	Black vulture	*Coragyps atratus*	*LC*
42	Malabar grey hornbill	*Ocyceros griseus*	*V*
43	Terrestrial brownbul	*Phyllastrephus terrestris*	DD
44	Painted stork	*Mycteria leucocephala*	*NT*
45	Lesser fish eagle	*Icthyophaga humilis*	*V*
46	Purple sunbird	*Cinnyris asiaticus*	LC
47	Indian paradise flycatcher	*Terpsiphone paradisi*	*LC*
48	European honey buzzard	*Pernis apivorus*	*LC*
49	Greater painted-snipe	*Rostratula benghalensis*	NT
50	Black-naped monarch	*Hypothymis azurea*	*LC*

Discussion

The avian diversity documented in both Thattekad and Wayanad Wildlife Sanctuaries underscores the ecological significance of these protected areas in the Western Ghats biodiversity hotspot. Both sanctuaries harbor bird species of high conservation priority, with approximately 20% of the recorded species in each sanctuary falling under threatened categories (Near Threatened, Vulnerable, or Threatened). This finding aligns with previous studies highlighting the Western Ghats as a critical habitat for endemic and threatened avian fauna (Grimmett&Inskipp, 2007) [7]. The presence of five vulnerable species in Thattekad and six vulnerable species in Wayanad indicates that these sanctuaries serve as important refuges for birds facing substantial conservation challenges. Particularly noteworthy is the occurrence of iconic species like the Great Indian Hornbill in both sanctuaries, which acts as an umbrella species whose conservation benefits numerous other forest-dependent species. The presence of specialized forest birds like the Malabar Trogon (*Harpactes fasciatus*), Ceylon Frogmouth (*Batrachostomus moniliger*), and various hornbill species indicates healthy forest ecosystems with intact canopy structure. Meanwhile, the occurrence of waterbirds such as lesser whistling Duck (*Dendrocygna javanica*), River Tern (*Sterna aurantia*), and little grebe (*Tachybaptus ruficollis*) in Wayanad demonstrates the importance of wetland habitats within the sanctuary.

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