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Srivari Illam, No. 61, Karthik Nagar, 10th Street, Saravanampatti, Coimbatore, Tamil Nadu 641035, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

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continued on the back inside cover

Cover: Indian Grey Wolf *Canis lupus pallipes* and Smooth-coated Otter *Lutrogale perspicillata* sharing the territory in Chambal basin. Digital art on Procreate by Aakanksha Komanduri.



An annotated checklist of the avifauna of Pichavaram Mangrove Forest, southern India: a Ramsar wetland with conservation significance

I. Jamil Hussain¹ & K. Jahir Hussain²

^{1,2} PG & Research Department of Zoology, C. Abdul Hakeem College (Autonomous), Melvisharam, Tamil Nadu 632509; affiliated with Thiruvalluvar University, Serkkadu, Vellore 632115, Tamil Nadu, India.

¹jamilhussain1997@gmail.com, ²jahir.zoo@cahc.edu.in (corresponding author)

Abstract: An assessment of avian diversity was conducted in the Pichavaram Mangrove Forest (PMF), Tamil Nadu, from October 2022 to December 2025. A consolidated inventory combining historical and present records documented 221 bird species for PMF, of which 196 species belonging to 58 families and 20 orders were recorded during the present survey. Comparison with previous studies revealed a marked decline in recorded species richness during 2004–2007 relative to 1984–1988, followed by a substantial increase in species richness during the present study. Of the 196 species documented, 98 were waterbirds and 98 terrestrial species, reflecting a balanced community structure. The dominance of Charadriiformes, Passeriformes, and Pelecaniformes reflects the availability of diverse aquatic and terrestrial habitats within PMF. Frequency of occurrence status showed a skewed distribution with more frequent than infrequent species, suggesting the presence of a relatively stable core assemblage of regularly occurring species within this wetland system. Migratory status comprised 55.6% Residents, 38.8% Winter Migrants, 3.6% Local Migrants, 1.0% Passage Migrants, and 1.0% Summer Migrants. Fifteen species generally regarded as winter migrants were recorded throughout the year during the present study, and were therefore classified as over-summering winter migrants, highlighting the availability of resources within PMF. The occurrence of 13 ‘Near Threatened’, six ‘Vulnerable’, and two ‘Endangered’ species underscores the conservation importance of the site. Seven shorebird species and 37 other species were newly-recorded, reflecting either range extensions or improved detection. Twenty-five historically-reported species were not detected in core habitats, suggesting potential shifts in habitat suitability. Overall, the findings reinforce the ecological significance of PMF within the Central Asian Flyway, and highlight its critical role in sustaining both migratory and resident communities.

Keywords: Avian diversity, bird conservation, Central Asian Flyway, coastal wetlands, mangrove ecosystem, over-summering winter migrants, shorebirds, wetland birds.

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Author details: I. JAMIL HUSSAIN is a research scholar, currently pursuing his Ph.D. under the guidance of Dr. K. Jahir Hussain, with research interests focused on avian diversity, biodiversity assessment, and conservation ecology. DR. K. JAHIR HUSSAIN is a research supervisor and assistant professor in the PG and Research Department of Zoology at C. Abdul Hakeem College (Autonomous), affiliated to Thiruvalluvar University. He obtained his M.Sc. and M.Phil. degrees in Zoology from Madurai Kamaraj University and his Ph.D. from the University of Madras in 2007. His research focuses on biodiversity conservation and environmental impact assessment. He has worked at the Indira Gandhi Centre for Atomic Research, Kalpakkam, as a visiting scientist and senior consultant at NBA, Chennai.

Author contributions: IJH—conducted field surveys, collected and analyzed the data, and prepared the original manuscript draft. KJH conceptualized and supervised the study, provided methodological guidance, and critically revised the manuscript.

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INTRODUCTION

Mangrove ecosystems are among the most productive and ecologically significant wetland habitats worldwide, providing vital ecological services including coastal protection, biodiversity support, and biogeochemical cycling. The Pichavaram Mangrove Forest (PMF) comprises a network of tidal creeks, mudflats, mangrove islands, and rich mangrove vegetation, which dynamically interact with riverine habitats, supporting diverse avian assemblages throughout the year (Sampath & Krishnamurthy 1993; Kathiresan 2000). The PMF was designated as a Ramsar Site (Site no. 2482) on 8 April 2022, in recognition of its international ecological importance (Ramsar Convention Secretariat 2022). The avifauna of PMF includes resident as well as long- and short-distance migratory species, as documented in earlier studies (Sampath & Krishnamurthy 1993; Nagarajan & Thiyagesan 1996). A total of 75 waterbird species have been recorded in this area (Nagarajan & Thiyagesan 2014). The migratory season extends from September to April, with peak abundance observed between November and January (Sampath & Krishnamurthy 1993; Nagarajan & Thiyagesan 1996). The high availability of benthic invertebrates and aquatic prey within mangrove mudflats attracts large congregations of wetland birds, especially from the end of the northeast monsoon to the post-monsoon season (Jagadheesan & Pandiyan 2021). PMF functions as a critical stopover and wintering ground for migratory birds along the Central Asian Flyway (CAF) (Rashiba et al. 2022).

Despite their ecological richness, Indian mangroves face escalating threats from anthropogenic activities such as land reclamation, aquaculture, and pollution, which have led to documented declines in bird populations across various coastal regions (Kathiresan et al. 2015). Earlier avifaunal assessments at Pichavaram indicated a peak in bird diversity during the 1980s (Sampath & Krishnamurthy 1993), followed by a lower number of recorded species during the 2000s, coinciding with habitat degradation and wetland conversion for shrimp aquaculture (Sandilyan 2017). No comprehensive long-term updates have been published in the past decade. This study sought to provide a thorough reassessment of avifaunal diversity in the PMF, to evaluate the current status and temporal patterns in species richness, composition and taxonomic dominance. This study integrated historical species lists with new field observations conducted between 2022 and 2025. In addition to compiling an updated avifaunal checklist,

this study assessed patterns of species persistence, local disappearance, re-detection, and new species records by comparing historical records with contemporary field observations, highlighting their ecological and conservation significance.

MATERIAL AND METHODS

The PMF (11.442° N, 79.789° E), located in the Cauvery Delta region near the Bay of Bengal in Tamil Nadu, is one of the largest mangrove ecosystems in India, covering 1,474 ha (Image 1). Of the total area, 1,358 ha (92.13%) is designated as protected forest. The mangrove-estuarine ecosystem connects to the sea between the Vellar (north), Coleroon (south), and Uppanar (west) rivers, with water depths ranging 0.3–3.0 m. It comprises marshes, swamps, open water, sandbanks, dense mangroves (Image 4), mudflats (Image 5), agricultural lands, and abandoned fields (Kathiresan 2000). The PMF supports ecotourism through boating activities managed by the Tamil Nadu Tourism and Forest Department, while local fishing communities rely on its rich fish and shellfish resources for their livelihoods.

Field surveys were conducted once per month in different habitats at the PMF and adjacent areas from October 2022 to December 2025. Surveys were carried out during peak avian activity periods (0600–1130 h and 1500–1730 h) and avoided during adverse weather conditions. All surveys were conducted by the same observer to minimise observer-related variation in species detection and identification. To compile a comprehensive avifaunal checklist and facilitate comparison with previous inventories, surveys were conducted using the area search method (Ralph et al. 1993; Bibby et al. 2000), which involved systematic visual scans across predefined habitat areas, with all birds seen and heard being recorded during each survey. A total of 39 monthly surveys were undertaken across six major habitat types: mature mangrove forests, intertidal mudflats, sandbanks, shallow-water areas, restored mangrove areas, and adjacent agricultural lands, comprising a total of 234 surveys (39 months x 6 habitats). Each survey lasted approximately 45 min and covered about 2 km. Surveys were conducted using a combination of boat-based (33.3%) and foot-based (66.7%) observations, depending on habitat accessibility. This approach enabled systematic coverage of the study area and improved the detection of rare, cryptic, mobile, and habitat-specialist species. Observations were made using 10 × 50 binoculars and a spotting scope.

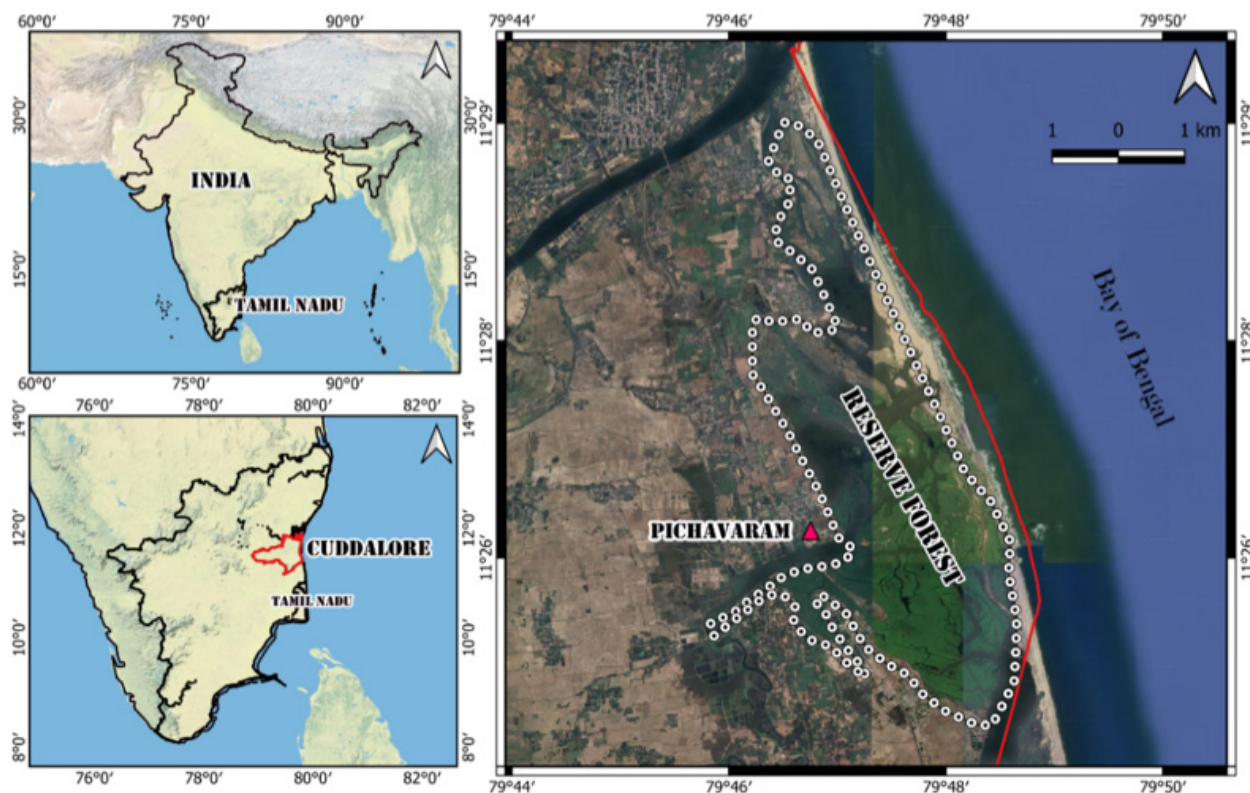


Image 1. Map of the study area showing Pichavaram Mangrove Forest.

Species identification was based on direct field observations and standard ornithological field guides (Ali 2002; Grimmett et al. 2016). Merlin Bird ID was used solely as an auxiliary identification tool and not as a standalone source for species confirmation (Cornell Lab of Ornithology 2023). Uncertain records were verified using photographic evidence obtained with a Nikon Coolpix P1000 camera and cross-referenced with field guides before inclusion in the final checklist.

Species were categorized as Resident (R), Winter Migrant (WM), Local Migrant (LM), Passage Migrant (PM), and Summer Migrant (SM) following Grimmett et al. (2016). Species with documented breeding records in Tamil Nadu were denoted as winter migrants with breeding records (WM[#]) or summer migrants with breeding records (SM[#]), as appropriate, based on published literature (Subramanya 2005; Byju et al. 2023b, 2025; Hussain & Hussain 2026). Species recorded throughout the year despite being recognized as winter migrants were denoted as over-summering winter migrants (WM*) following Byju et al. (2024a). Occurrence status was classified based on the frequency of sightings across 39 pooled monthly visits following MacKinnon & Phillipps (1993). Species recorded during > 60 % of visits (24–39 visits) were categorised as Common (C),

those recorded during 20–59 % of visits (8–23 visits) as Uncommon (UC), those recorded during 5–19 % of visits (2–7 visits) as Rare (Ra), and species recorded only once as Very Rare (VR). These categories represent frequency of occurrence rather than quantitative abundance. Nomenclature and taxonomic sequence followed the updated online Checklist of the Birds of India maintained by Praveen & Jayapal (2026, Version 10.0; accessed January 2026), while conservation status followed the IUCN Red List of Threatened Species (IUCN 2025).

RESULTS AND DISCUSSION

An annotated checklist of the avifauna recorded from PMF, including common and scientific names, frequency of occurrence, migratory status and IUCN conservation status, is provided in Table 1. During this survey, 196 species belonging to 58 families and 20 orders were documented. Of these, 152 species were reported in previous surveys, whereas 44 species constitute new records for PMF (Table 1). In contrast, 25 species documented in earlier studies were not detected during the current survey (Table 2). Consequently, the cumulative avifaunal inventory of PMF, integrating both historical

Table 1. Checklist and status of avifauna in Pichavaram Mangrove Forest, southern India.

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
Order: Anseriformes				
Family: Anatidae				
Northern Pintail	<i>Anas acuta</i>	WM	Ra	LC
Common Teal	<i>Anas crecca</i>	WM	Ra	LC
Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	R	UC	LC
Fulvous Whistling-Duck*	<i>Dendrocygna bicolor</i>	R	Ra	LC
Lesser Whistling-Duck*	<i>Dendrocygna javanica</i>	R	Ra	LC
Eurasian Wigeon	<i>Mareca penelope</i>	WM	Ra	LC
Gadwall	<i>Mareca strepera</i>	WM	Ra	LC
Cotton Pygmy-Goose	<i>Nettapus coromandelianus</i>	R	VR	LC
Northern Shoveler	<i>Spatula clypeata</i>	WM	VR	LC
Garganey	<i>Spatula querquedula</i>	WM	Ra	LC
Order: Phoenicopteriformes				
Family: Phoenicopteridae				
Greater Flamingo	<i>Phoenicopeterus roseus</i>	R	VR	LC
Order: Galliformes				
Family: Phasianidae				
Grey Francolin	<i>Ortygornis pondicerianus</i>	R	C	LC
Indian Peafowl	<i>Pavo cristatus</i>	R	C	LC
Jungle Bush-Quail	<i>Perdica asiatica</i>	R	VR	LC
Order: Podicipediformes				
Family: Podicipedidae				
Little Grebe	<i>Tachybaptus ruficollis</i>	R	Ra	LC
Order: Columbiformes				
Family: Columbidae				
Rock Pigeon	<i>Columba livia</i>	R	C	LC
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	R	C	LC
Spotted Dove	<i>Spilopelia chinensis</i>	R	C	LC
Laughing Dove	<i>Spilopelia senegalensis</i>	R	Ra	LC
Order: Apodiformes				
Family: Apodidae				
Little Swift	<i>Apus affinis</i>	R	Ra	LC
Asian Palm Swift	<i>Cypsiurus balasensis</i>	R	C	LC
Order: Cuculiformes				
Family: Cuculidae				
Grey-bellied Cuckoo*	<i>Cacomantis passerinus</i>	PM	Ra	LC
Greater Coucal	<i>Centropus sinensis</i>	R	C	LC
Order: Charadriiformes				
Family: Burhinidae				
Great Thick-knee	<i>Esacus recurvirostris</i>	R	Ra	NT
Indian Thick-knee	<i>Burhinus indicus</i>	R	UC	LC
Family: Haematopodidae				
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	WM	UC	NT
Family: Recurvirostridae				
Black-winged Stilt	<i>Himantopus himantopus</i>	R	C	LC
Family: Charadriidae				
Kentish Plover	<i>Anarhynchus alexandrinus</i>	WM*	C	LC
Tibetan Sand-Plover	<i>Anarhynchus atrifrons</i>	WM*	C	LC
Greater Sand-Plover	<i>Anarhynchus leschenaultii</i>	WM*	C	LC
Common Ringed Plover	<i>Charadrius hiaticula</i>	WM	Ra	LC
Pacific Golden-Plover	<i>Pluvialis fulva</i>	WM*	C	LC
Grey Plover	<i>Pluvialis squatarola</i>	WM*	C	VU
Little Ringed Plover	<i>Thinornis dubius</i>	WM*	C	LC
Grey-headed Lapwing*	<i>Vanellus cinereus</i>	WM	Ra	LC
Red-wattled Lapwing	<i>Vanellus indicus</i>	R	C	LC
Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	R	Ra	LC
Family: Jacanidae				
Pheasant-tailed Jacana*	<i>Hydrophasianus chirurgus</i>	R	VR	LC
Family: Scolopacidae				
Common Sandpiper	<i>Actitis hypoleucos</i>	WM*	C	LC
Ruddy Turnstone	<i>Arenaria interpres</i>	WM	UC	NT

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
Great Knot*	<i>Calidris tenuirostris</i>	WM	VR	EN
Sanderling*	<i>Calidris alba</i>	WM	UC	LC
Dunlin	<i>Calidris alpina</i>	WM	Ra	NT
Broad-billed Sandpiper	<i>Calidris falcinellus</i>	WM	VR	VU
Curlew Sandpiper	<i>Calidris ferruginea</i>	WM	Ra	VU
Little Stint	<i>Calidris minuta</i>	WM	UC	LC
Ruff	<i>Calidris pugnax</i>	WM	Ra	LC
Red-necked Stint*	<i>Calidris ruficollis</i>	WM	Ra	NT
Temminck's Stint	<i>Calidris temminckii</i>	WM	UC	LC
Common Snipe	<i>Gallinago gallinago</i>	WM	UC	LC
Pin-tailed Snipe*	<i>Gallinago stenura</i>	WM	Ra	LC
Bar-tailed Godwit	<i>Limosa lapponica</i>	WM	Ra	NT
Black-tailed Godwit	<i>Limosa limosa</i>	WM	Ra	NT
Eurasian Curlew	<i>Numenius arquata</i>	WM	UC	NT
Whimbrel	<i>Numenius phaeopus</i>	WM*	C	LC
Spotted Redshank	<i>Tringa erythropus</i>	WM	Ra	LC
Wood Sandpiper	<i>Tringa glareola</i>	WM*	C	LC
Common Greenshank	<i>Tringa nebularia</i>	WM*	C	LC
Green Sandpiper	<i>Tringa ochropus</i>	WM	UC	LC
Marsh Sandpiper	<i>Tringa stagnatilis</i>	WM*	C	LC
Common Redshank	<i>Tringa totanus</i>	WM*	C	LC
Terek Sandpiper	<i>Xenus cinereus</i>	WM	Ra	LC
Family: Glareolidae				
Small Pratincole	<i>Glareola lactea</i>	R	UC	LC
Oriental Pratincole*	<i>Glareola maldivarum</i>	SM*	Ra	LC
Family: Laridae				
Whiskered Tern	<i>Chlidonias hybrida</i>	WM	UC	LC
Brown-headed Gull	<i>Chroicocephalus brunnicephalus</i>	WM	UC	LC
Slender-billed Gull*	<i>Chroicocephalus genei</i>	WM	Ra	LC
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	WM	UC	LC
Gull-billed Tern	<i>Gelochelidon nilotica</i>	WM*	C	LC
Caspian Tern	<i>Hydroprogne caspia</i>	WM*	C	LC
Pallas's Gull	<i>Ichthyaeus ichthyaeus</i>	WM	UC	LC
Lesser Black-backed Gull	<i>Larus fuscus</i>	WM	UC	LC
Bridled Tern*	<i>Onychoprion anaethetus</i>	WM#	VR	LC
River Tern	<i>Sterna aurantia</i>	LM	Ra	VU
Common Tern	<i>Sterna hirundo</i>	WM	UC	LC
Little Tern	<i>Sternula albifrons</i>	WM#	C	LC

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
Lesser Crested Tern*	<i>Thalasseus bengalensis</i>	WM*	C	LC
Great Crested Tern	<i>Thalasseus bergii</i>	WM#	C	LC
Sandwich Tern*	<i>Thalasseus sandvicensis</i>	WM	Ra	LC
Order: Ciconiiformes				
Family: Ciconiidae				
Asian Openbill	<i>Anastomus oscitans</i>	R	C	LC
Painted Stork	<i>Mycteria leucocephala</i>	R	C	LC
Order: Suliformes				
Family: Anhingidae				
Oriental Darter	<i>Anhinga melanogaster</i>	R	UC	LC
Family: Phalacrocoracidae				
Little Cormorant	<i>Microcarbo niger</i>	R	C	LC
Great Cormorant	<i>Phalacrocorax carbo</i>	WM#	Ra	LC
Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	R	Ra	LC
Order: Pelecaniformes				
Family: Pelecanidae				
Spot-billed Pelican*	<i>Pelecanus philippensis</i>	R	Ra	NT
Family: Ardeidae				
Great Egret	<i>Ardea alba</i>	R	C	LC
Eastern Cattle Egret	<i>Ardea coromanda</i>	R	C	LC
Intermediate Egret	<i>Ardea intermedia</i>	R	C	LC
Grey Heron	<i>Ardea cinerea</i>	R	C	LC
Purple Heron	<i>Ardea purpurea</i>	R	C	LC
Indian Pond Heron	<i>Ardeola grayii</i>	R	C	LC
Little Heron	<i>Butorides atricapilla</i>	R	C	LC
Black Bittern	<i>Botaurus flavicollis</i>	LM	Ra	LC
Little Egret	<i>Egretta garzetta</i>	R	C	LC
Western Reef Egret	<i>Egretta gularis</i>	LM	Ra	LC
Cinnamon Bittern	<i>Botaurus cinnamomeus</i>	LM	Ra	LC
Yellow Bittern*	<i>Botaurus sinensis</i>	LM	UC	LC
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	R	UC	LC
Family: Threskiornithidae				
Eurasian Spoonbill	<i>Platalea leucorodia</i>	R	UC	LC
Glossy Ibis	<i>Plegadis falcinellus</i>	R	UC	LC
Black-headed Ibis	<i>Threskiornis melanocephalus</i>	R	C	LC
Order: Accipitriformes				
Family: Pandionidae				
Osprey	<i>Pandion haliaetus</i>	WM	UC	LC

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
Family: Accipitridae				
White-eyed Buzzard*	<i>Butastur teesa</i>	LM	VR	LC
Short-toed Snake-Eagle*	<i>Circaetus gallicus</i>	R	VR	LC
Greater Spotted Eagle*	<i>Clanga clanga</i>	WM	VR	VU
Western Marsh Harrier	<i>Circus aeruginosus</i>	WM	VR	LC
Pallid Harrier	<i>Circus macrourus</i>	WM	VR	NT
Black-winged Kite	<i>Elanus caeruleus</i>	R	UC	LC
Brahminy Kite	<i>Haliastur indus</i>	R	C	LC
Booted Eagle*	<i>Hieraetus pennatus</i>	WM	Ra	LC
White-bellied Sea-Eagle	<i>Ichthyophaga leucogaster</i>	R	VR	LC
Black Kite	<i>Milvus migrans</i>	R	C	LC
Oriental Honey-Buzzard*	<i>Pernis ptilorhynchus</i>	LM	VR	LC
Shikra	<i>Tachyspiza badia</i>	R	C	LC
Order: Strigiformes				
Family: Tytonidae				
Eastern Barn Owl	<i>Tyto javanica</i>	R	Ra	LC
Family: Strigidae				
Spotted Owlet	<i>Athene brama</i>	R	UC	LC
Indian Scops-Owl*	<i>Otus bakkamoena</i>	R	VR	LC
Mottled Wood-Owl*	<i>Strix ocellata</i>	R	VR	LC
Order: Bucerotiformes				
Family: Upupidae				
Eurasian Hoopoe	<i>Upupa epops</i>	R	C	LC
Order: Piciformes				
Family: Megalaimidae				
Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	R	UC	LC
Family: Picidae				
Black-rumped Flameback	<i>Dinopium benghalense</i>	R	UC	LC
Order: Coraciiformes				
Family: Meropidae				
Asian Green Bee-eater	<i>Merops orientalis</i>	R	C	LC
Blue-tailed Bee-eater	<i>Merops philippinus</i>	R	C	LC
Family: Coraciidae				
Indian Roller	<i>Coracias benghalensis</i>	R	C	NT
Family: Alcedinidae				
Common Kingfisher	<i>Alcedo atthis</i>	R	C	LC
Pied Kingfisher	<i>Ceryle rudis</i>	R	C	LC
Black-capped Kingfisher	<i>Halcyon pileata</i>	R	Ra	VU

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	R	C	LC
Order: Falconiformes				
Family: Falconidae				
Common Kestrel	<i>Falco tinnunculus</i>	WM	Ra	LC
Peregrine Falcon	<i>Falco peregrinus</i>	WM	VR	LC
Order: Psittaciformes				
Family: Psittaculidae				
Rose-ringed Parakeet	<i>Psittacula krameri</i>	R	C	LC
Order: Passeriformes				
Family: Pittidae				
Indian Pitta	<i>Pitta brachyura</i>	WM	Ra	LC
Family: Campephagidae				
Black-headed Cuckooshrike*	<i>Lalage melanoptera</i>	PM	VR	LC
Family: Oriolidae				
Indian Golden Oriole	<i>Oriolus kundoo</i>	WM	UC	LC
Family: Artamidae				
Ashy Woodswallow	<i>Artamus fuscus</i>	R	UC	LC
Family: Vangidae				
Common Woodshrike	<i>Tephrodornis pondicerianus</i>	R	Ra	LC
Family: Aegithinidae				
Common Iora	<i>Aegithina tiphia</i>	R	Ra	LC
Family: Dicruridae				
Black Drongo	<i>Dicrurus macrocercus</i>	R	C	LC
Family: Laniidae				
Brown Shrike	<i>Lanius cristatus</i>	WM	Ra	LC
Family: Corvidae				
House Crow	<i>Corvus splendens</i>	R	C	LC
Large-billed Crow	<i>Corvus macrorhynchos</i>	R	C	LC
Rufous Treepie	<i>Dendrocitta vagabunda</i>	R	C	LC
Family: Monarchidae				
Indian Paradise-Flycatcher	<i>Terpsiphone paradisi</i>	R	Ra	LC
Family: Dicaeidae				
Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	R	UC	LC
Family: Nectariniidae				
Loten's Sunbird*	<i>Cinnyris lotenius</i>	R	UC	LC
Purple Sunbird	<i>Cinnyris asiaticus</i>	R	C	LC
Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	R	C	LC
Family: Ploceidae				
Baya Weaver*	<i>Ploceus philippinus</i>	R	Ra	LC

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
Family: Estrildidae				
Indian Silverbill*	<i>Euodice malabarica</i>	R	Ra	LC
Scaly-breasted Munia	<i>Lonchura punctulata</i>	R	Ra	LC
Tricoloured Munia*	<i>Lonchura malacca</i>	R	Ra	LC
White-rumped Munia*	<i>Lonchura striata</i>	R	Ra	LC
Family: Passeridae				
House Sparrow	<i>Passer domesticus</i>	R	UC	LC
Yellow-throated Sparrow	<i>Gymnoris xanthocollis</i>	R	UC	LC
Family: Motacillidae				
Blyth's Pipit*	<i>Anthus godlewskii</i>	WM	Ra	LC
Richard's Pipit*	<i>Anthus richardi</i>	WM	Ra	LC
Paddyfield Pipit	<i>Anthus rufulus</i>	R	C	LC
Forest Wagtail	<i>Dendronanthus indicus</i>	WM	VR	LC
White Wagtail	<i>Motacilla alba</i>	WM	VR	LC
Grey Wagtail	<i>Motacilla cinerea</i>	WM	VR	LC
Citrine Wagtail*	<i>Motacilla citreola</i>	WM	Ra	LC
Western Yellow Wagtail	<i>Motacilla flava</i>	WM	UC	LC
White-browed Wagtail	<i>Motacilla maderaspatensis</i>	R	C	LC
Eastern Yellow Wagtail*	<i>Motacilla tschutschensis</i>	WM	Ra	LC
Family: Alaudidae				
Oriental Skylark	<i>Alauda gulgula</i>	R	UC	LC
Ashy-crowned Sparrow-Lark	<i>Eremopterix griseus</i>	R	UC	LC
Singing Bushlark*	<i>Mirafra javanica</i>	R	UC	LC
Jerdon's Bushlark*	<i>Plocealauda affinis</i>	R	C	LC
Indian Bushlark	<i>Plocealauda erythroptera</i>	R	Ra	LC
Family: Cisticolidae				
Zitting Cisticola*	<i>Cisticola juncidis</i>	R	UC	LC

Common name	Scientific name	Migratory status	Frequency of occurrence	IUCN Red List status
Common Tailorbird	<i>Orthotomus sutorius</i>	R	C	LC
Plain Prinia	<i>Prinia inornata</i>	R	UC	LC
Ashy Prinia*	<i>Prinia socialis</i>	R	C	LC
Family: Acrocephalidae				
Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	WM	Ra	LC
Family: Hirundinidae				
Eastern Red-rumped Swallow	<i>Cecropis daurica</i>	WM	Ra	LC
Barn Swallow	<i>Hirundo rustica</i>	WM*	C	LC
Wire-tailed Swallow*	<i>Hirundo smithii</i>	R	C	LC
Family: Pycnonotidae				
White-browed Bulbul	<i>Pycnonotus luteolus</i>	R	UC	LC
Red-vented Bulbul	<i>Pycnonotus cafer</i>	R	C	LC
Family: Leiothrichidae				
Yellow-billed Babbler*	<i>Argya affinis</i>	R	C	LC
Family: Sturnidae				
Common Myna	<i>Acridotheres tristis</i>	R	C	LC
Rosy Starling	<i>Pastor roseus</i>	WM	Ra	LC
Brahminy Starling	<i>Sturnia pagodarum</i>	R	C	LC
Family: Muscicapidae				
Indian Robin	<i>Copsychus fulicatus</i>	R	UC	LC
Oriental Magpie-Robin	<i>Copsychus saularis</i>	R	C	LC
Pied Bushchat *	<i>Saxicola caprata</i>	R	Ra	LC

Migratory status: R—Resident | WM—Winter Migrant | LM—Local Migrant | PM—Passage Migrant | SM—Summer Migrant | WM*—Over-summering winter migrant | WM"—Winter migrant with breeding records in Tamil Nadu | SM"—Summer migrant with breeding records in Tamil Nadu.
Frequency of occurrence: C—Common | UC—Uncommon | Ra—Rare | VR—Very Rare.
IUCN Red List status: LC—Least Concern | NT—Near Threatened | VU—Vulnerable | EN—Endangered.
+—New records added in the present study.

and contemporary records, comprises 221 species. The avifaunal assemblage was taxonomically dominated by Charadriiformes (56 species) and Passeriformes (55 species), followed by Pelecaniformes (17 species) and Accipitriformes (13 species). All remaining orders showed moderate to low representation, with several taxa represented by few or single species, reflecting variation in species richness among orders (Image 2).

The predominance of Charadriiformes and Pelecaniformes reflects the importance of aquatic habitats, particularly mudflats, sandbanks and shallow

wetlands, within the study area. The comparable representation of Passeriformes reflects the presence of dense mangrove vegetation and surrounding terrestrial habitats, highlighting the heterogeneous nature of the ecosystem. Similar taxonomic patterns have been reported from comparable coastal wetland ecosystems (Balachandran & Thirunavukarasu 2022; Byju et al. 2023a; Alam et al. 2023; Shree & Malathi 2024). Regional inventories have reported 160 species from Muthupet (Deiva 1999), 178 species from Kalpakkam (Hussain et al. 2011), 294 species from Point Calimere (Balachandran

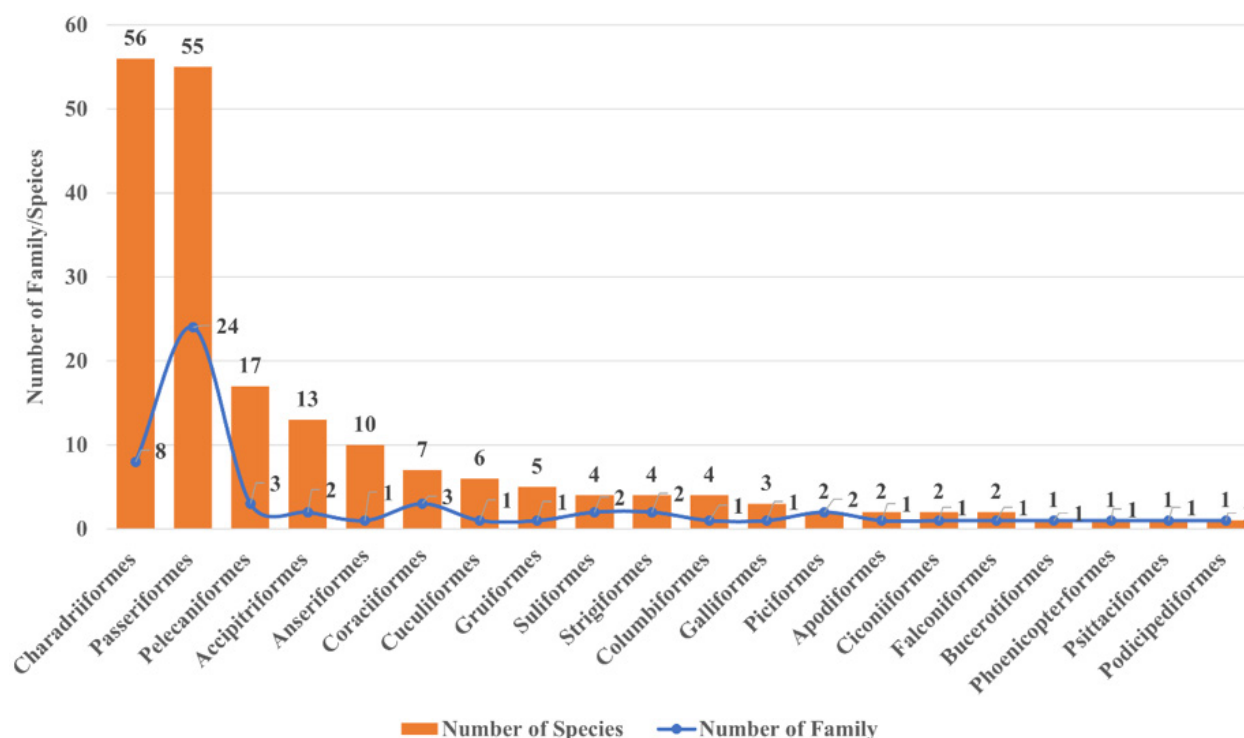


Image 2. Community richness of avian orders and families in Pichavaram Mangrove Forest.

& Thirunavukarasu 2022), 107 species from Karangadu (Byju et al. 2023a), 124 species from Muttukadu (Shree & Malathi 2024), and 161 species from Pulicat Lake (Alam et al. 2023). While these comparisons provide useful regional context, differences in survey duration, sampling effort, seasonal coverage, habitat extent, and survey methodologies among studies may influence recorded species richness and should be considered when interpreting direct comparisons across sites.

Based on the cumulative inventory of 221 species, PMF represents one of the more species-rich mangrove-associated bird habitats documented along the east coast of India and within Tamil Nadu; its avifaunal diversity ranks second only to that of Point Calimere. Such comparisons should be interpreted cautiously due to differences in sampling effort and habitat extent. The earliest comprehensive inventory conducted in PMF between 1984 and 1988 recorded 177 species (Sampath & Krishnamurthy 1993), whereas a subsequent survey during 2004–2007 documented only 100 species (Sandilyan 2012). Across the three survey periods mentioned (including the present study), 94 species were consistently recorded, indicating a core assemblage that has persisted over time. In addition to these shared species, 58 species recorded during the 1984–1988 study were also detected in the present investigation but were not documented during the 2004–2007

survey. In contrast, 19 species reported by Sampath & Krishnamurthy (1993) and six species reported by Sandilyan (2012), a total of 25 species, were not detected during the current survey. The present study additionally documented 44 species that had not been reported in previous inventories, thereby substantially expanding the known avifaunal diversity of PMF (Table 1).

Of the 196 species recorded during this survey, 98 were waterbirds, and 98 were terrestrial birds. Compared with the historical baseline of 177 species reported by Sampath & Krishnamurthy (1993), 152 species (85.8%) were recorded again in the present study. Among the major taxonomic groups, Pelecaniformes showed the highest proportion of species recorded (100%; 15 of 15 species), followed by Charadriiformes (93.8%; 45 of 48 species), Anseriformes (88.9%; 8 of 9 species), and Passeriformes (75.6%; 38 of 49 species). Families represented by a single species in the historical baseline and absent from the present survey included Turnicidae (Small Buttonquail *Turnix sylvaticus*), Sylviidae (Lesser Whitethroat *Curruca curruca*), and Phylloscopidae (Large-billed Leaf Warbler *Phylloscopus magnirostris*). This observed loss aligns with previous research attributing such declines to a combination of habitat degradation, aquaculture expansion, tourism-induced disturbances, and cyclonic impacts (Sandilyan 2017; Byju et al. 2026).

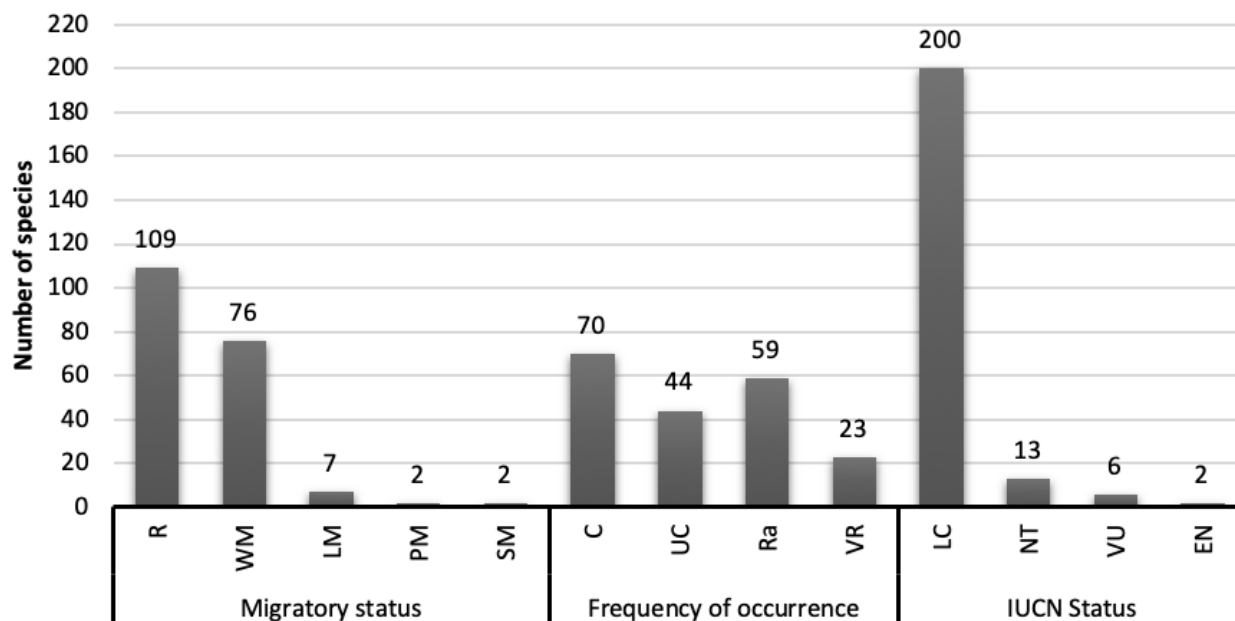


Image 3. Avifauna of Pichavaram Mangrove Forest based on migratory status, occurrence and IUCN Red List status.

Table 2. Species reported in previous surveys of Pichavaram Mangrove Forest by Sampath & Krishnamurthy (1993) and Sandilyan (2012) that were not recorded during the present study (n = 25).

Common name	Scientific name	IUCN Red List status
Egyptian Vulture	<i>Neophron percnopterus</i>	EN
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	NT
Red-necked Falcon	<i>Falco chicquera</i>	NT
Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	LC
Bay-backed Shrike	<i>Lanius vittatus</i>	LC
Bengal Bushlark	<i>Plocealauda assamica</i>	LC
Besra	<i>Tachyspiza virgata</i>	LC
Brown-breasted Flycatcher	<i>Muscicapa muttui</i>	LC
Common Babbler	<i>Argya caudata</i>	LC
Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	LC
Crested Lark	<i>Galerida cristata</i>	LC
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC
Large-billed Leaf Warbler	<i>Phylloscopus magnirostris</i>	LC
Lesser Whitethroat	<i>Curruca curruca</i>	LC
Long-tailed Shrike	<i>Lanius schach</i>	LC
Mallard	<i>Anas platyrhynchos</i>	LC
Montagu's Harrier	<i>Circus pygargus</i>	LC
Pied Avocet	<i>Recurvirostra avosetta</i>	LC
Pied Harrier	<i>Circus melanoleucos</i>	LC
Slaty-breasted Rail	<i>Lewinia striata</i>	LC
Slaty-legged Crane	<i>Rallina eurizonoides</i>	LC
Small Buttonquail	<i>Turnix sylvaticus</i>	LC
Streak-throated Swallow	<i>Petrochelidon fluvicola</i>	LC
Thick-billed Warbler	<i>Arundinax aedon</i>	LC
White Stork	<i>Ciconia ciconia</i>	LC

The migratory composition revealed the dominance of resident species (109 species; 55.6%), followed by winter migrants (76 species; 38.8%), local migrants (7 species; 3.6%), passage migrants (2 species; 1%), and summer migrants (2 species; 1%). Notably, 15 typically migratory species, including Grey Plover *Pluvialis squatarola* (Image 6), Greater Sand Plover *Anarhynchus leschenaultii*, Pacific Golden-Plover *Pluvialis fulva* (Image 7), Whimbrel *Numenius phaeopus*, Common Greenshank *Tringa nebularia*, Common Redshank *Tringa totanus*, Kentish Plover *Anarhynchus alexandrinus*, Tibetan Sand-Plover *Anarhynchus atrifrons*, and Barn Swallow *Hirundo rustica* were recorded throughout the year. These species are winter migrants in the region (Grimmett et al. 2016); however, their year-round occurrence in PMF suggests the presence of over-summering individuals, a phenomenon that has also been documented along the southeastern coast of India (Byju et al. 2024a). The year-round occurrence of these species suggests that PMF provides suitable feeding and roosting resources for over-summering individuals beyond the typical wintering period (van de Kam et al. 2004). In addition, five species are classified as winter migrants and one species is classified as a summer migrant with published breeding records from Tamil Nadu and are denoted in present checklist (Subramanya 2005; Byju et al. 2023b, 2025; Hussain & Hussain 2026). The proportion of winter migrants aligns with other eastern coast studies (25–42 %) (Abhisheka et al. 2013; Alam et al. 2023; Byju et al. 2024b; Shree & Malathi 2024) (Image 3). These findings



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Image 4. An aerial view of the mangrove forest in Pichavaram Reserve Forest.



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Image 5. An aerial view of the mudflat and sandy beach in Killai Reserve Forest.

highlight the continued importance of the PMF as a key coastal wetland supporting resident and migratory bird communities along the Coromandel Coast.

The frequency of occurrence was classified into four categories based on sighting frequency (Image 3). The Common category (35.7%) included 70 species, primarily from Scolopacidae, Ardeidae, Laridae, Columbidae, and Motacillidae. Frequently recorded shorebird and water-associated species included Great Crested Tern *Thalasseus bergii* (Image 8), Lesser Crested Tern *Thalasseus bengalensis*, Caspian Tern *Hydroprogne caspia*, Gull-billed Tern *Gelochelidon nilotica*, Wood Sandpiper *Tringa glareola*, Pacific Golden-Plover, and Whimbrel, consistent with previous studies (Sampath & Krishnamurthy 1993; Deiva 1999; Byju et al. 2024b; Shree & Malathi 2024). The Uncommon category (22.5%) included 44 species such as members of Sturnidae, Meropidae, Strigidae, and Accipitridae, likely to reflect habitat specificity or seasonal variation. Rare species (30.1%), including Black-capped Kingfisher *Halcyon pileata*, Laughing Dove *Spilopelia senegalensis*, Grey-bellied Cuckoo *Cacomantis passerinus*, Little Swift *Apus affinis*, Eurasian Coot *Fulica atra*, and Grey-headed Swamphen *Porphyrio poliocephalus* were recorded sporadically and were often associated with specific habitat features within PMF, including mangrove areas, shallow-water areas, and adjacent agricultural habitats. The Very Rare category (11.7%) comprised 23 species, including Watercock *Gallicrex cinerea*, Western Marsh Harrier *Circus aeruginosus*, Pallid Harrier *Circus macrourus*, Cotton Pygmy-Goose *Nettapus coromandelianus*, and Northern Shoveler *Spatula clypeata*, each recorded only once during this study. Similar patterns of infrequent occurrence of the above taxa have been reported from the Muthupet Mangrove Forest (Deiva 1999). The frequency of occurrence pattern exhibited unequal distribution, with many frequent species and comparatively few infrequent species. The observed pattern is consistent with findings from the southeast coastal mangrove ecosystems reported by Byju et al. (2023a).

Based on the IUCN Red List (IUCN 2025), of the 221 species, 200 were classified (Image 3) as 'Least Concern', 13 as 'Near Threatened', including Dunlin *Calidris alpina*, Ruddy Turnstone *Arenaria interpres* (Image 9), Eurasian Curlew *Numenius arquata* (Image 10), and Bar-tailed Godwit *Limosa lapponica* (Image 11). Six species were classified as 'Vulnerable', including Curlew Sandpiper *Calidris ferruginea* (Image 12), Broad-billed Sandpiper *Calidris falcinellus*, River Tern *Sterna aurantia*, Greater Spotted Eagle *Clanga clanga*, Grey Plover, and Black-



Image 6. Grey Plover.



Image 7. A flock of Pacific Golden-Plover in the Pichavaram Mangrove Forest.



Image 8. A flock of Great Crested Tern in the Pichavaram Mangrove Forest.



Image 9. Ruddy Turnstone.



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Image 10. Eurasian Curlew.



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Image 11. Bar-tailed Godwit.



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Image 12. Curlew Sandpiper.



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Image 13. Great Knot.

capped Kingfisher, while Great Knot *Calidris tenuirostris* (Image 13) and Egyptian Vulture *Neophron percnopterus* (historical record) were categorised as 'Endangered'. The occurrence of globally threatened species highlights the conservation importance of PMF (Table 1 & 2) and its role in regional and flyway-level biodiversity conservation. Comparable studies along the east coast report similar patterns of threatened species occurrence (Byju et al. 2023a; Alam et al. 2023; Shree & Malathi 2024). The intertidal mudflats and sandbanks function as critical feeding habitats for migratory shorebirds, while mangrove habitats provide important feeding, roosting, and refuge sites for several wetland-dependent species of conservation significance. Conservation efforts should prioritize the protection and restoration of mudflat and mangrove habitats, together with the maintenance of natural tidal connectivity, to sustain habitat quality and prey availability for migratory birds (van de Kam et al. 2004). Regulation of tourism, boat traffic, and intensive fishing activities in key feeding and roosting areas is also

necessary, as anthropogenic disturbance represents an important pressure on coastal wetland ecosystems (Sandilyan 2017; Byju et al. 2024b). Furthermore, long-term monitoring of threatened and migratory species should be incorporated into management programmes to evaluate population trends and habitat use (Rashiba et al. 2022; Byju et al. 2026). The ongoing monitoring surveys established through the present study provide a valuable foundation for tracking temporal changes in avian diversity, habitat use, and population trends within PMF. Such measures would strengthen the role of PMF as an important stopover and wintering site for migratory birds along the Central Asian Flyway.

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Tamil Nadu 641006, India
ravi@threatenedtaxa.org & ravi@zooreach.org

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