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Avian Diversity of Pala Tipo (Palak Lake): A Ramsar Site in Mizoram, Northeast India

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Abstract
Pala Tipo (Palak Lake), located in the southern part of Mizoram, Northeast India, is a designated Ramsar site that hosts a diverse assemblage of avifauna. This study provides a comprehensive account of 61 bird species recorded from the lake and its surrounding habitats, representing 28 families across 13 orders. The order Passeriformes emerged as the most dominant, accounting for 40 species (65.57%) of the total bird community, followed by Pelecaniformes with 7 species (11.48%), primarily from the family Ardeidae (Herons and Egrets), and Piciformes with 5 species (8.20%). Other orders such as Suliformes, Cuculiformes, Gruiformes, and Coraciiformes each contributed 2-3 species, while several orders, including Galliformes, Columbiformes, Charadriiformes, Strigiformes, and Bucerotiformes, were represented by a single species each. Family-wise analysis revealed Ardeidae as the most species-rich non-passerine family, while within Passeriformes, Muscicapidae (flycatchers and robins) was the most diverse, contributing 5 species (8.20%). Multiple passerine families, including Cisticolidae, Pycnonotidae, Phylloscopidae, Dicruridae, Leiothrichidae, Turdidae, and Picidae, each comprised 3 species (4.92%). This varied representation of avian taxa highlights the ecological richness and habitat heterogeneity of the Palak Lake area, supporting both generalist and specialist bird species. All recorded species are listed as Least Concern on the IUCN Red List, except for the Slaty-backed Flycatcher (*Ficedula erithacus*), categorized as Vulnerable and protected under Schedule I of the Wildlife Protection Act. This article highlights the significance of Pala Lake as a crucial habitat for both resident and migratory bird species, and emphasizes the need for conservation efforts, especially in light of human-induced habitat changes.

Keywords: Pala Tipo, Ramsar site, Biodiversity hotspot, Avifauna, Mizoram

1. Introduction
The Indo-Myanmar region, recognized as one of the world's biodiversity hotspots, spans parts of Northeast India, Myanmar, Bangladesh, and adjoining areas [1]. This region hosts a wide range of ecosystems, including numerous ponds, wetlands, floodplains, and seasonal water bodies that support a diverse assemblage of pond birds [2]. These birds are integral to wetland ecology and play key roles in ecosystem functioning and biodiversity maintenance [3]. Northeast India, a region known for its rich biodiversity and varied ecosystems, is home to numerous freshwater bodies including ponds, lakes, and wetlands. These aquatic habitats support a wide variety of pond birds, which play crucial roles in maintaining ecological balance [4]. The region's unique geography and climate make it a vital area for both resident and migratory bird species [5]. Wetlands rank among the most biologically productive and ecologically important ecosystems on the planet [6]. They play a vital role in sustaining biodiversity by offering critical breeding, feeding, and nesting habitats for a wide array of avian species, including both resident and migratory birds [7].

Bird diversity serves as a vital indicator of ecosystem health and ecological stability across both terrestrial and aquatic environments [8]. The occurrence of a wide range of avian species particularly in ecologically sensitive areas such as wetlands, forests, and grasslands reflects habitat heterogeneity, the availability of diverse resources, and low levels of human disturbance [9]. Birds occupy multiple ecological niches and play essential roles in maintaining ecological processes [10]. Due to their sensitivity to changes in habitat quality, pollution, and climate variability, birds are widely recognized as effective bioindicators [11]. A reduction in bird populations can signal ecological stress, habitat degradation, or imbalances within the food web [12].

Functionally, birds are critical to ecosystem balance and productivity. As mobile and widely distributed organisms, they interact with various trophic levels and influence key ecological functions such as seed dispersal, pollination, pest control, and nutrient cycling [13]. Nectarivorous birds such as sunbirds, hummingbirds, and lorikeets facilitate pollination by transferring pollen between flowers while feeding, thereby supporting plant reproduction [14]. This function is especially important in tropical and subtropical regions where avian pollinators are prominent. Frugivorous birds contribute to forest regeneration by dispersing seeds away from parent plants, helping maintain plant diversity and promoting spatial heterogeneity in vegetation [15]. Insectivorous species such as drongos, flycatchers, and warblers regulate insect populations, thereby providing natural pest control in both natural habitats and agricultural landscapes [16]. This reduces the need for chemical pesticides and supports sustainable farming practices.

Scavenging birds including vultures, crows, and kites play an important role in environmental sanitation by consuming carrion [17]. This behaviour minimizes the risk of disease outbreaks and aids in the decomposition process. Furthermore, bird droppings (guano) contribute to nutrient cycling by enriching soils with nitrogen and phosphorus, especially in nutrient-poor ecosystems like wetlands and islands [18]. Birds also occupy a range of trophic levels from primary consumers such as seed-eaters, to secondary consumers like insectivores, and apex predators such as raptors [19]. This trophic diversity supports complex food webs and enhances ecosystem resilience by buffering against ecological disruptions and population imbalances.

Given their ecological roles and sensitivity to environmental changes, birds serve as early warning indicators of ecosystem health. Fluctuations in bird populations particularly those inhabiting wetlands can reveal underlying issues such as pollution, hydrological changes, or habitat fragmentation, thereby informing conservation planning and ecosystem management strategies [20]. Birds are among the most visible and appreciated components of biodiversity. Their vibrant colours, melodic calls, and diverse behaviours make them highly attractive to nature lovers and travellers. Bird watching**,** or avian ecotourism, has emerged as a major segment of the global ecotourism industry, promoting sustainable travel to natural areas with a focus on observing and conserving bird species and their habitats [21].

Pala Tipo (Palak Lake), located in the Siaha district of southern Mizoram, Northeast India, is one such ecologically significant wetland. Highlighting its importance and recognized for its ecological value, the lake was designated as a Ramsar site in 2021 [22]. Situated amidst the undulating hills and bordered by dense tracts of moist deciduous forest, Palak Lake represents a mosaic of aquatic and terrestrial habitats. This diverse landscape creates a unique ecological niche that supports a high richness and abundance of bird species. The interplay of forested catchments, open water bodies, and marshy margins provides ideal conditions for a wide range of avifauna with varying ecological requirements.

Despite its recognized importance, comprehensive scientific documentation of the avifaunal diversity at Palak Lake has been relatively sparse. Previous efforts have largely been anecdotal or limited in scope. This study aims to address that gap by presenting a detailed and systematic inventory of bird species observed in and around Palak Lake. Additionally, it evaluates the conservation status of each species based on IUCN Red List assessments and Indian wildlife protection regulations. The findings also explore habitat preferences, ecological roles, and potential threats faced by these birds, contributing valuable insights for future conservation planning and wetland management in the region.

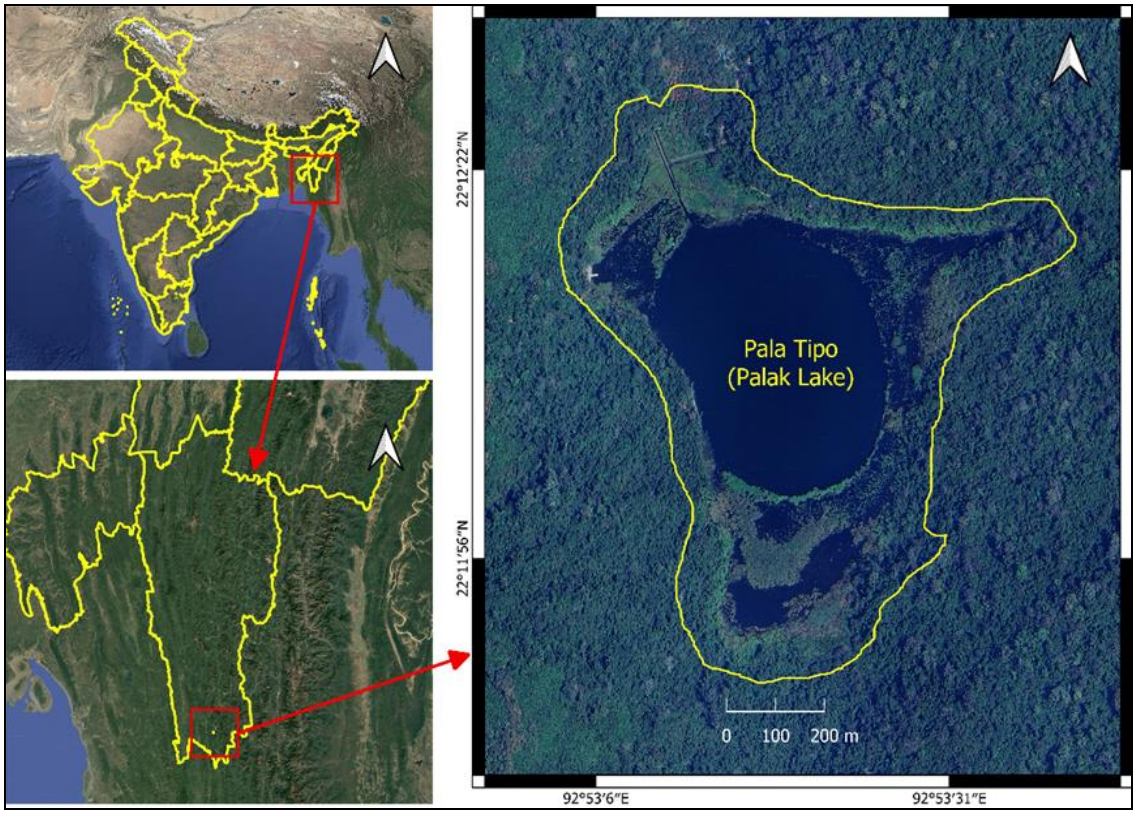

Fig 1: Pala Tipo (Palak Lake) of Mizoram, India

2. Materials and Methods

2.1 Study Area

Pala Tipo, also known as Palak lake (meaning "swallowing lake" in the Mara language), is the largest natural lake in Mizoram, India. Situated near Phura village in Siaha district, within the Mara Autonomous District Council, it lies approximately 330 km south of Aizawl. The water body size is roughly about 135 ha with an average depth of about 20 m and the wetland nestled at an elevation of 275-589 meters above sea level **(**Coordinates: 22º 11' 49" N, 92º 54' 07" E) [23]. The wetland and the adjoining forest area are designated as the Pala Wetland Reserve Forest, encompassing a total of 1,850 hectares, including the lake's entire catchment area [24].

2.2 Data Collection

Field observations were carried out using direct visual identification, photographic documentation, and recognition of auditory cues such as bird calls and songs to assist and ensure accurate species identification. Surveys were carried out over multiple visits across different seasons starting from January 2024 to August 2025 to ensure comprehensive coverage. This approach allowed for the detection of both resident bird species that inhabit the area year-round and migratory species that are present only during specific times of the year, thereby enhancing the overall reliability and completeness of the species inventory.

2.3 Species Identification

Bird species identification was carried out using field guides, Birds of the Indian Subcontinent (Grimmett *et al*., 2011) [25]. The scientific classification, local names (in Mizo), conservation status (as per IUCN Red List, 2025) [26], and protection status (as per the Wildlife Protection Act of India, 1972) were recorded for each species.

3. Results and Discussion

3.1 Species Richness and Taxonomic Composition

A total of 61 bird species representing 28 families and 13 avian orders were documented during the field surveys conducted in and around Palak Lake (Table 1).

Order-wise Distribution of Bird Species

The avifaunal survey conducted in and around Palak Lake documented bird species belonging to 13 different avian orders (Fig.2). Among these, the order Passeriformes was the most dominant, contributing 40 species, which accounts for approximately 65.57% of the total bird species recorded. The next most represented order is Pelecaniformes, represented solely by the family Ardeidae (Herons and Egrets), with 7 species, making up 11.48% of the total species count. The order Piciformes follows with 5 species (8.20%), including various woodpeckers and barbets.

Other orders like Suliformes, Cuculiformes, Gruiformes, and Coraciiformes each contribute 2 to 3 species, with their individual percentages ranging from 3.28% to 4.92%. Orders such as Galliformes, Columbiformes, Charadriiformes, Strigiformes, and Bucerotiformes are each represented by a single species, contributing just 1.64% of the total avifauna per order. This order-wise distribution highlights the dominance of passerines in the region and the presence of a variety of non-passerine groups that contribute to the ecological diversity.

Family-wise Distribution of Bird Species

Bird species recorded during the survey belong to 28 different families, showing considerable taxonomic diversity (Fig.3). Among these, the family Ardeidae (Herons and Egrets) is the most species-rich non-passerine group, contributing 7 species, which is 11.48% of the total recorded species. Within the order Passeriformes, the family Muscicapidae (flycatchers and robins) is the most diverse, with 5 species, comprising 8.20% of the total.

Several other Passeriformes families such as Picidae, Cisticolidae, Phylloscopidae, Pycnonotidae, Dicruridae, Turdidae, and Leiothrichidae each contribute 3 species, accounting for 4.92% of the total species per family. Families like Cuculidae, Rallidae, Meropidae, Megalaimidae, Pellorneidae, Oriolidae, Corvidae, and Nectariniidae each have 2 species, contributing 3.28% each to the overall avifaunal diversity.

A significant number of families such as Phasianidae, Columbidae, Charadriidae, Anhingidae, Phalacrocoracidae, Strigidae, Bucerotidae, Alcedinidae, Monarchidae, Sturnidae, and Chloropseidae are represented by only one species each, thus making up 1.64% per family. This variation in species richness across families underlines both the habitat complexity of Palak Lake and the presence of specialized ecological niches supporting a wide range of bird taxa.

Table 1: Check list of Bird species from Pala Tipo (Palak lake), Mizoram

Order & Family	Common Name	Scientific Name	Local Name	IUCN Redlist	WPA Schedule
Galliformes: Phasianidae	Red Junglefowl	*Gallus gallus*	Ram-ar	Least Concern	Schedule-II
Columbiformes: Columbidae	Asian Emerald Dove	*Chalcophaps indica*	Ram-parva	Least Concern	Schedule-II
Cuculiformes: Cuculidae	Greater Coucal	*Centropus sinensis*	Lalruanga-sehnawt	Least Concern	Schedule-II
	Fork-tailed Drongo-Cuckoo	*Surniculus dicruroides*		Least Concern	Schedule-II
Gruiformes: Rallidae	Common/ Eurasian Moorhen	*Gallinula chloropus*	Rih-ar	Least Concern	Schedule-II
	White-breasted Waterhen	*Amaurornis phoenicurus*	Kawruak/ Tui-ar	Least Concern	Schedule-II
Charadriiformes: Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	Mangkhaia-ralveng	Least Concern	Schedule-II
Suliformes: Anhingidae	Oriental Darter	*Anhinga melanogaster*	Varul	Least Concern	Schedule-II
Suliformes: Phalacrocoracidae	Little Cormorant	*Microcarbo niger*	Tuivarak-dum	Least Concern	Schedule-II
Suliformes: Phalacrocoracidae	Cinnamon Bittern	*Ixobrychus cinnamomeus*	Vakawk	Least Concern	Schedule-II
	Little Egret	*Egretta garzetta*	Tuiva-arngo	Least Concern	Schedule-II
	Cattle Egret	*Bubulcus ibis*	Tuiva-arngo	Least Concern	Schedule-II
	Indian Pond-Heron	*Ardeola Greyii*	Tuivalawng/ Vacha	Least Concern	Schedule-II
	Striated Heron	*Butorides striata*	Kawr-uak	Least Concern	Schedule-II
	Grey Heron	*Ardea cinerea*	Kawlpui-saruhhak	Least Concern	Schedule-II
	Great Egret	*Ardea alba*		Least Concern	Schedule-II
	Chinese Pond-Heron	*Ardeola bacchus*		Least Concern	Schedule-II
Strigiformes: Strigidae	Collared Owlet	*Taenioptynx brodiei*	Hrangkir	Least Concern	Schedule-II
Bucerotiformes: Bucerotidae	Oriental Pied-Hornbill	*Anthracoceros albirostris*	Vahai	Least Concern	Schedule-I
Coraciiformes: Alcedinidae	White-throated Kingfisher	*Halcyon smyrnensis*	Kaikuangral-awmvar	Least Concern	Schedule-II
Coraciiformes: Meropidae	Chestnut-headed Bee-eater	*Merops leschenaulti*	Fuanhawr	Least Concern	Schedule-II

	Green/ Small Bee-eater	*Merops orientalis*	Tlakawrh-te	Least Concern	Schedule-II
Piciformes: Megalaimidae	Blue-throated Barbet	*Psilopogon asiaticus*	Tuklo	Least Concern	Schedule-II
	Coppersmith Barbet	*Psilopogon haemacephalus*	Vatalhkhuang	Least Concern	Schedule-II
Piciformes: Picidae	Greater Flameback	*Chrysocolaptes guttacristatus*	Thlohpui	Least Concern	Schedule-II
	Lesser Yellownape	*Picus chlorolophus*	Thloh-lupar	Least Concern	Schedule-II
	Great Slaty Woodpecker	*Mulleripicus pulverulentus*	Thlohsai	Least Concern	Schedule-II
Passeriformes: Oriolidae	Black-hooded Oriole	*Oriolus xanthornus*	Vamaitai-ludum	Least Concern	Schedule-II
	Maroon Oriole	*Oriolus traillii*	Changsen	Least Concern	Schedule-II
Passeriformes: Dicruridae	Black Drongo	*Dicrurus macrocercus*	Changkak	Least Concern	Schedule-II
	Lesser Racket-tailed Drongo	*Dicrurus remifer*	Thlanthla-changhlawi	Least Concern	Schedule-II
	Greater Racket-tailed Drongo	*Dicrurus paradiseus*	Vakul-changhlawi	Least Concern	Schedule-II
Passeriformes: Monarchidae	Black-naped Monarch	*Hypothymis azurea*	Zumzek	Least Concern	Schedule-II
Passeriformes: Corvidae	Common Green-Magpie	*Cissa chinensis*	Dawntliang	Least Concern	Schedule-II
	Large-billed Crow	*Corvus macrorhynchos*	Cho-ak	Least Concern	Schedule-II
Passeriformes: Cisticolidae	Common Tailorbird	*Orthotomus sutorius*	Daikat	Least Concern	Schedule-II
	Dark-necked Tailorbird	*Orthotomus atrogularis*	Hnah-khawr	Least Concern	Schedule-II
	Yellow-bellied Prinia	*Prinia flaviventris*	Zirziak-dul-eng	Least Concern	Schedule-II
Passeriformes: Pycnonotidae	Black-crested Bulbul	*Rubigula flaviventris*	Tukkhumvilik	Least Concern	Schedule-II
	Red-vented Bulbul	*Pycnonotus cafer*	Tlaiberh	Least Concern	Schedule-II
	White-throated Bulbul	*Alophoixus flaveolus*	Dawkek	Least Concern	Schedule-II
Passeriformes: Phylloscopidae	Yellow-browed Warbler	*Phylloscopus inornatus*	Vate-thla-rang	Least Concern	Schedule-II
	Dusky Warbler	*Phylloscopus fuscatus*	Lui-vate	Least Concern	Schedule-II
	Greenish Warbler	*Phylloscopus trochiloides*	Vate/ Chiai	Least Concern	Schedule-II
Passeriformes: Pellorneidae	Puff-throated Babbler	*Pellorneum ruficeps*	Valeisawt	Least Concern	Schedule-II
	Abbott's Babbler	*Malacocincla abbotti*	Dam-va	Least Concern	Schedule-II
Passeriformes: Leiothrichidae	Nepal Fulvetta/ Tit-Babbler	*Alcippe nipalensis*	Ngawpui-mitval	Least Concern	Schedule-II
	Lesser Necklaced Laughingthrush	*Garrulax monileger*	Vazar/ Zarfek	Least Concern	Schedule-II
	White-crested Laughingthrush	*Garrulax leucolophus*	Koro-lupar	Least Concern	Schedule-II
Passeriformes: Sturnidae	Common Hill Myna	*Gracula religiosa*	Vaiva	Least Concern	Schedule-II
Passeriformes: Turdidae	Scaly Thrush	*Zoothera dauma*	Chippui	Least Concern	Schedule-II
	Tickell's Thrush	*Turdus unicolor*		Least Concern	Schedule-II
	Black-breasted Thrush	*Turdus dissimilis*	Vatik	Least Concern	Schedule-II
Passeriformes: Muscicapidae	Oriental Magpie-Robin	*Copsychus saularis*	Khawmual chinrang	Least Concern	Schedule-II
	White-rumped Shama	*Copsychus malabaricus*	Vatelal	Least Concern	Schedule-II
	Taiga Flycatcher	*Ficedula albicilla*	Ter	Least Concern	Schedule-II
	Slaty-backed Flycatcher	*Ficedula erithacus*	Akak	Vulnerable	Schedule-I
	Daurian Redstart	*Phoenicurus auroreus*	Thlek-thlek	Least Concern	Schedule-II
Passeriformes: Nectariniidae	Crimson Sunbird	*Aethopyga siparaja*	Dawithiama-arpa-senlar	Least Concern	Schedule-II
	Little Spiderhunter	*Arachnothera longirostra*	Tumbu-ar/ Lawizit/ Zetzet	Least Concern	Schedule-II
Passeriformes: Chloropseidae	Jerdon's Blue-winged Leafbird	*Chloropsis cochinchinensis*	Chhawlhring-thlapawl	Least Concern	Schedule-II
Families: 28	Total Species: 61				

Table 2: Birds species abundance in percentage from Pala Tipo (Palak Lake), Mizoram.

Order	Family	No of Species	% of Total Species (61)
Galliformes	Phasianidae	1	1.64%
Columbiformes	Columbidae	1	1.64%
Cuculiformes	Cuculidae	2	3.28%
Gruiformes	Rallidae	2	3.28%
Charadriiformes	Charadriidae	1	1.64%
Suliformes	Anhingidae	1	1.64%
	Phalacrocoracidae	1	1.64%
Pelecaniformes*	Ardeidae* (Herons & Egrets)	7	11.48%
Strigiformes	Strigidae	1	1.64%
Bucerotiformes	Bucerotidae	1	1.64%
Coraciiformes	Alcedinidae	1	1.64%
	Meropidae	2	3.28%
Piciformes	Megalaimidae	2	3.28%
	Picidae	3	4.92%
Passeriformes	Oriolidae	2	3.28%
	Dicruridae	3	4.92%
	Monarchidae	1	1.64%
	Corvidae	2	3.28%
	Cisticolidae	3	4.92%
	Pycnonotidae	3	4.92%
	Phylloscopidae	3	4.92%
	Pellorneidae	2	3.28%
	Leiothrichidae	3	4.92%
	Sturnidae	1	1.64%
	Turdidae	3	4.92%
	Muscicapidae	5	8.20%
	Nectariniidae	2	3.28%
	Chloropseidae	1	1.64%
Galliformes	Phasianidae	1	1.64%
Columbiformes	Columbidae	1	1.64%
Cuculiformes	Cuculidae	2	3.28%
Gruiformes	Rallidae	2	3.28%
Charadriiformes	Charadriidae	1	1.64%

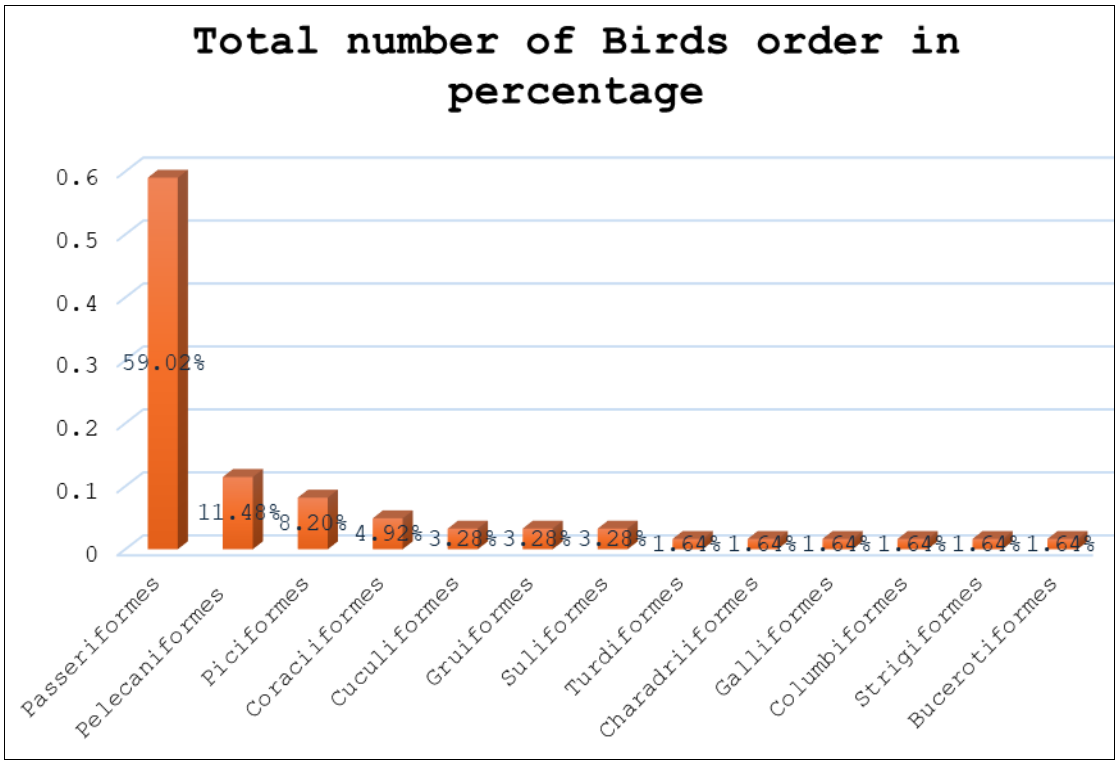

Fig 2: Order-wise distribution of birds (in percentage) from Pala Tipo (Palak Lake), Mizoram

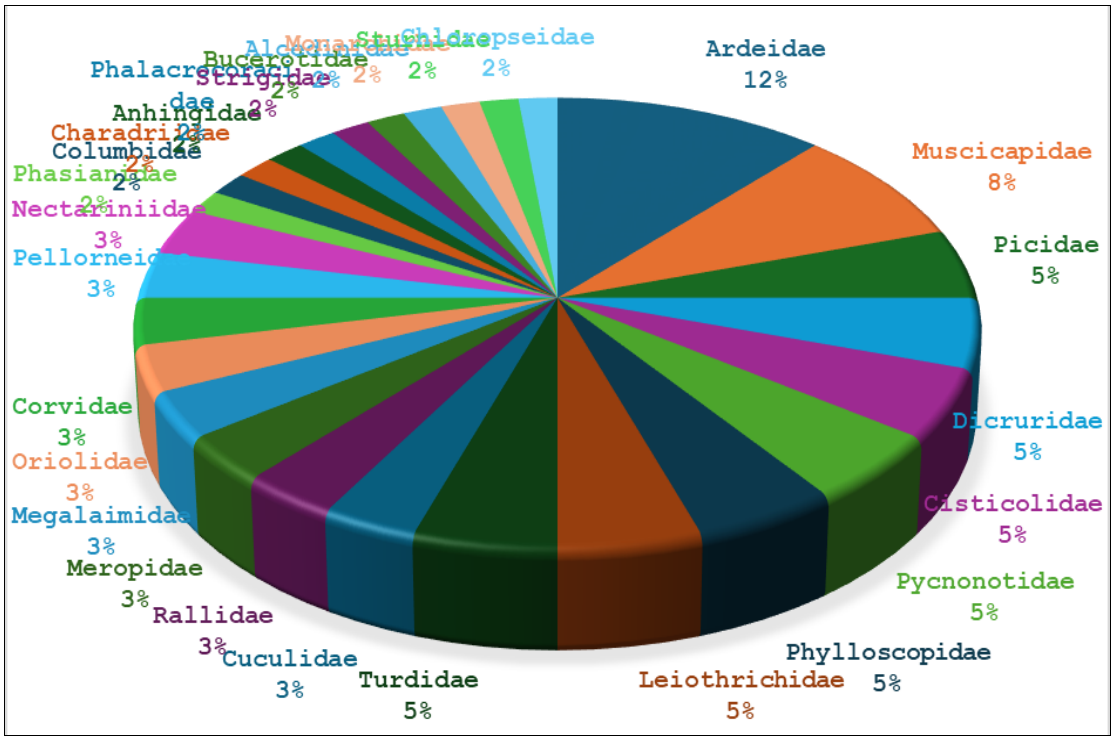

Fig 3: Family-wise distribution of birds (in percentage) from Pala Tipo (Palak Lake), Mizoram

3.2 Habitat Utilization

The avian community at Palak Lake utilizes a range of habitat types, reflecting the ecological complexity and habitat heterogeneity of the landscape. Species were observed in diverse microhabitats including open freshwater bodies, marshes, reed beds, forest fringes, and regenerating secondary growth areas.

Aquatic and semi-aquatic birds such as the Indian Pond-Heron (*Ardeola grayii*), Little Egret (*Egretta garzetta*), and Little Cormorant (*Microcarbo niger*) were frequently sighted along the lake margins, indicating the availability of suitable foraging and nesting grounds in the wetland zones. Conversely, forest-dependent species like the Great Slaty Woodpecker (*Mulleripicus pulverulentus*) and Black-naped Monarch (*Hypothymis azurea*) were predominantly found in the forested slopes and canopy-rich areas surrounding the lake, suggesting the importance of maintaining contiguous forest cover in the catchment region.This variety of habitats supports a complex avifaunal community and underscores the ecological connectivity between wetland and terrestrial

ecosystems at Palak Lake.

3.3 Conservation Status

An assessment of the conservation status based on the IUCN Red List revealed that the vast majority of bird species recorded at Pala Lake (60 out of 61) are currently classified as Least Concern. This is indicative of relatively stable populations and favourable habitat conditions at present. However, one species the Slaty-backed Flycatcher (*Ficedula erithacus*) is categorized as Vulnerable due to ongoing habitat loss in both its breeding and wintering ranges across Asia.

In terms of legal protection under the Wildlife Protection Act (WPA), 1972 of India, two species are listed under Schedule I: the Oriental Pied-Hornbill (*Anthracoceros albirostris*) and the Slaty-backed Flycatcher. Schedule I provides the highest level of legal protection, underscoring the national conservation priority of these species. The remaining species are protected under Schedule II, which still offers significant legal safeguards but denotes a lower priority compared to Schedule I species.

3.4 Endemism and Regional Significance

Although none of the bird species recorded during the study are endemic to Mizoram, several have important cultural, ecological, or symbolic significance in the region. For instance, the Common Hill Myna (*Gracula religiosa*), known for its mimicry skills, and the Oriental Pied-Hornbill (*Anthracoceros albirostris*), often associated with folklore and traditional beliefs, hold notable positions in local cultural narratives [27].

Furthermore, the high number of Schedule-II species observed highlights the ecological value of the site, even though these birds are not currently classified as globally threatened. Their presence underscores the need for habitat protection and long-term ecological monitoring. These species may serve as important indicators of environmental health and ecosystem stability.

The findings reinforce the role of Palak Lake not only as a habitat for biodiversity conservation but also as a site of socio-ecological importance that warrants continued research, community engagement, and proactive conservation strategies.

4. Conclusion

Pala Tipo (Palak Lake) serves as a vital biodiversity hotspot in the state of Mizoram, playing a key role in maintaining the ecological integrity of the region. The presence of a diverse and vibrant avian community reflects the health and richness of this wetland ecosystem and the adjoining forest landscapes. The wide range of bird species spanning various ecological guilds and habitat preferences not only highlights the ecological value of the lake but also reinforces its importance as a refuge for both resident and migratory birds.

Although the majority of species documented at Palak Lake are currently classified as Least Concern under the IUCN Red List, this status should not lead to complacency. Subtle and gradual threats, such as habitat degradation, pollution, encroachment, and climate variability, can have cumulative impacts on bird populations over time. Therefore, regular ecological monitoring and long-term avifaunal surveys are crucial for tracking population trends and identifying early warning signs of decline.

To safeguard the ecological functions of Palak Lake and ensure the long-term survival of its birdlife, proactive conservation strategies must be implemented. These should include participatory wetland management involving local communities, who are often the primary stewards of the land. Education and awareness programs can foster a sense of ownership and promote sustainable practices that minimize human-induced pressures on the ecosystem. Additionally, enforcing existing legal protections and integrating traditional ecological knowledge with scientific approaches can strengthen conservation outcomes. By adopting such holistic and inclusive measures, Palak Lake can be effectively preserved as a thriving sanctuary for avian biodiversity and a model for wetland conservation in Northeast India.

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