International Journal of Agricultural and Applied Sciences, June 2023, 4(1): 115-119
https://www.agetds.com/ijaas
ISSN: 2582-8053
https://doi.org/10.52804/ijaas2023.4119

Research Article

OPEN ACCESS

Bird diversity of in and around Melamadai Lake Madurai city, Tamil Nadu state, India; A preliminary study

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(**Received:** 02/02/2023; **Revised:** 29/04/2023; **Accepted:** 22/06/2023)

ABSTRACT
Fresh water Lakes are suitable habitat for birds along with food and water. In the present study an attempt has been made to assess the diversity of avian fauna in Melamadai Lake in Madurai district, Tamilnadu state. The duration of study period in January 2021 to December 2021. Eighty-four species of birds were observed, belonging to 41 families, 18 order in Melamadai lake. In this study recorded in Least concern (LC) 79 species and Near Threatened (NT)Five species. The five Near Threatened species - Oriental Darter (*Anhinga melanogaster),* Pied Cuckoo-dove(*Reinwardtoena browni),* Spot-billed Pelican (*Pelecanus philippensis),* Black-headed Ibis (*Threskiornis melanocephalus) and* Painted Stork-*(Mycteria leucocephala)*- are protected under Schedule IV of the Indian Wildlife Protection Act, 1972. The diversity of avifauna is taken for identifying the importance of biodiversity for Madurai which is among the top ten tourism sites of world. The role of urban areas in functions such as provision of ecosystem services will largely be determined by patterns of biodiversity within that area.
Keywords: Birds, species, diversity, Lake, Status, wetland, Madurai.

INTRODUCTION

Aquatic ecosystems are important one which provide livelihoods for the millions of people who live around them. Man depends ponds for most of his needs like fishing, agriculture, irrigation, and other domestic purposes. Ponds are playing a very good role in rain harvesting, storage of water and regulation of ground water level. So in order to maintain the ground water level we must conserve ponds and pond habitat. Birds are found throughout the world, at approximately all altitudes and nearly every climate. They are a natural way to control pests in gardens, on farms and in aquatic ecosystems (HV Wanjari ;2016).

India has around 67,429 wetlands, covering an area of about 4.1 million hectares. Out of these, 2,175 are natural and 65,254 are manmade. Wetlands in India (excluding rivers), account for 18.4% of the country's geographic area, of which 70% is under paddy cultivation (MoEF 1990; Parekh & Gadhvi 2013). Many species of birds respond to small changes in habitat structure and composition, therefore they serve as good indicators of changes in the environment. The presence of aquatic birds anywhere speaks volumes of the environment as to whether all is well or there is something amiss. It also shows the biological importance or going technical, the biodiversity significance of an area (HV Wanjari ;2016). Wetlands in India provide a unique habitat to many aquatic Flora and fauna as well as numerous birds including migratory species. Out of 310 species of wetland birds found in India (Kumar et al. 2005; Kumar & Gupta 2009, 2013) almost half are migratory which visit India from cold areas of different parts of China, Russia, central Asia, and from across the entire range of the Himalaya. Freshwater lakes one of the important types of wetlands, play a vital role in the economics of their respective regions, especially with reference to agriculture, fishing, livestock maintenance and drinking water facilities of the adjacent areas. The geographic location of a wetland may determine how and when birds will use it or use adjacent habitat (Manikannan, 2011).

Birds are essential animal group of an ecosystem which play a functional role in the ecosystem and are rightly called as bioindicators. There are more than 10000 bird species in the world, out of these 1313 species recorded from Indian subcontinent (Grimmett *et al*. 2011).

MATERIALS AND METHODS

Study area:

Figure 1. shows the Melamadai lake is located at 9°56'N latitude, 78°98'E longitudes. The lake belongs to Melamadai village in Madurai North taluk and Madurai East block. Melamadai lake is surrounded by Urbanization. It has abundant species richness due to suitable surrounding environment. The water body provides good habitat for many fishes, amphibian, odonates, etc., whereas the surrounding forest is a good habitat for bird, reptiles and other animals. The

Melamadai Lake was irrigation, domestic water supply and to provide water for livestock as well as controlling floods and reduction of problem of water shortage for the people living in Nearby and surrounding villages.

Survey of birds:

Data were collected using three methods: transect walk, point transects and direct observations. The most of surveys on the wetland's avifauna were conducted between January 2021 to December 2022 using a transect line approach (Bibby *et al.*, 1992) to extensively survey throughout the wetland area so as to assess the avifauna species and abundance. The birds' observations were carried out twice daily; morning between 6.30 to 10 AM and evening 3.30 to 6.30 PM, between 1600 and 1800 h by walking slowly along transects. Birds were counted as bird seen and heard and birds in flight were also recorded.

Table 1. Avifauna recorded from Melamadai Lake, Madurai district, Tamil Nadu.

S.No	Order	Family	Common name	Scientific name	IUCN status
1	Apodiformes	Apodidae	Asian Palm-Swift	Cypsiurus balasiensis	LC
2	Accipitriformes	Ardeidae	Cattle Egret	Bubulcus ibis	LC
3	Accipitriformes	Accipitridae	Shikra	ccipiter badius	LC
4	Anseriformes	Anatidae	Garganey	Spatula querquedula	LC
5	Accipitriformes	Accipitridae	Brahminy Kite	Haliastur indus	LC
6	Anseriformes	Anatidae	Indian Spot-billed Duck	Anas poecilorhyncha	LC
7	Anseriformes	Anatidae	Fulvous Whistling-Duck	Dendrocygna bicolor	LC
8	Anseriformes	Anatidae	Lesser Whistling-Duck	Dendrocygna javanica	LC
9	Apodiformes	Apodidae	Little Swift	Apus affinis	LC
10	Anseriformes	Anatidae	Northern Shoveler	Spatula clypeata	LC
11	Columbiformes	Columbidae	Rock Pigeon	Columba livia	LC
12	Columbiformes	Columbidae	Eurasian Collared-Dove	Streptopelia decaocto	LC
13	Cuculiformes	Cuculidae	Asian Koel	Eudynamys scolopaceus	LC
14	Coraciiformes	Alcedinidae	White-throated Kingfisher	Halcyon smyrnensis	LC
15	Columbiformes	Columbidae	Western Spotted Dove	Spilopelia suratensis	LC
16	Coraciiformes	Meropidae	Green Bee-eater	Merops viridissimus	LC
17	Coraciiformes	Meropidae	Blue-tailed Bee-eater	Merops philippinus	LC
18	Cuculiformes	Cuculidae	Greater Coucal	entropus sinensis	LC
19	Columbiformes	Columbidae	Pied Cuckoo-dove	Reinwardtoena browni	NT
20	Charadriiformes	Recurvirostridae	Black-winged Stilt	Himantopus himantopus	LC
21	Charadriiformes	Scolopacidae	Ruff	Calidris pugnax	LC
22	Charadriiformes	Laridae	Whiskered Tern	Chlidonias hybrida	LC
23	Coraciiformes	Coraciidae	Indian Roller	Coracias benghalensis	LC
24	Charadriiformes	Charadriidae	Red-wattled Lapwing	Vanellus indicus	LC
25	Charadriiformes	Scolopacidae	Green Sandpiper	Tringa ochropus	LC
26	Charadriiformes	Scolopacidae	Wood Sandpiper	Tringa glareola	LC
27	Charadriiformes	Scolopacidae	Common Sandpiper	Actitis hypoleucos	LC
28	Charadriiformes	Laridae	Common Tern	Sterna hirundo	LC
29	Coraciiformes	Alcedinidae	Common Kingfisher	Alcedo atthis	LC
30	Coraciiformes	Alcedinidae	Pied Kingfisher	Ceryle rudis	LC
31	Columbiformes	Columbidae	Laughing Dove	Spilopelia senegalensis	LC
32	Cuculiformes	Cuculidae	Blue-faced Malkoha	Phaenicophaeus viridirostris	LC
33	Charadriiformes	Scolopacidae	Common Snipe	Gallinago gallinago	LC
34	Ciconiiformes	Ciconiidae	Painted Stork	Mycteria leucocephala	NT
35	Charadriiformes	Scolopacidae	Marsh Sandpiper	Marsh Sandpiper	LC
36	Galliformes	Phasianidae	Indian Peafowl	Pavo cristatus	LC
37	Gruiformes	Rallidae	Eurasian Coot	Fulica atra	LC
38	Gruiformes	Rallidae	White-breasted Waterhen	Amaurornis phoenicurus	LC
39	Gruiformes	Rallidae	Watercock	Gallicrex cinerea	LC
40	Galliformes	Phasianidae	Gray Francolin	Francolinus pondicerianus	LC
41	Pelecaniformes	Ardeidae	Gray Heron	Ardea cinerea	LC
42	Pelecaniformes	Ardeidae	Purple Heron	Ardea purpurea	LC
43	Pelecaniformes	Ardeidae	Indian Pond-Heron	Ardeola grayii	LC
44	Pelecaniformes	Ardeidae	Black-crowned Night-Heron	Nycticorax nycticorax	LC
45	Pelecaniformes	Threskiornithidae	Glossy Ibis	Plegadis falcinellus	LC
46	Psittaciformes	Psittaculidae	Rose-ringed Parakeet	Alexandrinus krameri	LC
47	Passeriformes	Dicuridae	Black Drongo	Dicrurus macrocercus	LC
48	Passeriformes	Corvidae	Rufous Treepie	Dendrocitta vagabunda	LC
49	Passeriformes	Corvidae	House Crow	Corvus splendens	LC

50	Passeriformes	Cisticolidae	Common Tailorbird	Orthotomus sutorius	LC
51	Passeriformes	Pycnonotidae	Red-vented Bulbul	Pycnonotus cafer	LC
52	Passeriformes	Leiothrichidae	Yellow-billed Babbler	Argya affinis	LC
53	Passeriformes	Sturnidae	Common Myna	cridotheres tristis	LC
54	Passeriformes	Nectariniidae	Purple Sunbird	Cinnyris asiaticus	LC
55	Pelecaniformes	Ardeidae	Little Egret	Egretta garzetta	LC
56	Passeriformes	Dicruridae	Ashy Drongo	Dicrurus leucophaeus	LC
57	Passeriformes	Hirundinidae	Barn Swallow	Hirundo rustica	LC
58	Passeriformes	Nectariniidae	Purple-rumped Sunbird	Leptocoma zeylonica	LC
59	Passeriformes	Motacillidae	Yellow Wagtail	Motacilla flava	LC
60	Passeriformes	Laniidae	Brown Shrike	Lanius cristatus	LC
61	Passeriformes	Cisticolidae	Ashy Prinia	Prinia socialis	LC
62	Passeriformes	Cisticolidae	Plain Prinia	Prinia inornat	LC
63	Passeriformes	Acrocephalidae	Blyth's Reed Warbler	Acrocephalus dumetorum	LC
64	Podicipediformes	Podicipedidae	Little Grebe	achybaptus ruficollis	LC
65	Pelecaniformes	Pelecanidae	Spot-billed Pelican	Pelecanus philippensis	NT
66	Pelecaniformes	Ardeidae	Yellow Bittern	Ixobrychus sinensis	LC
67	Passeriformes	Acrocephalidae	Clamorous Reed Warbler	Acrocephalus stentoreus	LC
68	Passeriformes	Motacillidae	Western Yellow Wagtail	Motacilla flava	LC
69	Passeriformes	Motacillidae	White-browed Wagtail	Motacilla maderaspatensis	LC
70	Pelecaniformes	Ardeidae	Black Bittern	Ixobrychus flavicollis	LC
71	Passeriformes	Corvidae	Large-billed Crow	Corvus macrorhynchos	LC
72	Pelecaniformes	Threskiornithidae	Black-headed Ibis	Threskiornis melanocephalus	NT
73	Passeriformes	Estrildidae	Indian Silverbill	Euodice malabarica	LC
74	Passeriformes	Alaudidae	Jerdon's Bushlark	Mirafra affinis	LC
75	Passeriformes	Acrocephalidae	Booted Warbler	Iduna caligata	LC
76	Passeriformes	Sturnidae	Rosy Starling	Pastor roseus	LC
77	Passeriformes	Dicaeidae	Pale-billed Flowerpecker	Dicaeum erythrorhynchos	LC
78	Passeriformes	Motacillidae	Paddyfield Pipit	Dicaeum erythrorhynchos	LC
79	Passeriformes	Passeridae	House Sparrow	Passer domesticus	LC
80	Passeriformes	Oriolidae	Indian Golden Oriole	Oriolus kundoo	LC
81	Suliformes	Anhingidae	Oriental Darter	Anhinga melanogaster	NT
82	Suliformes	Phalacrocoracidae	Indian Cormorant	Phalacrocorax fuscicollis	LC
83	Suliformes	Phalacrocoracidae	Little Cormorant	Microcarbo niger	LC
84	Strigiformes	Strigidae	Spotted Owlet	Athene brama	LC

Table 2. Showing in IUCN status of birds in Melamadai Lake

S.No	IUCN status	Number of birds
1	Least Concern (LC)	79
2	Near threatened (NT)	5
	Total	84

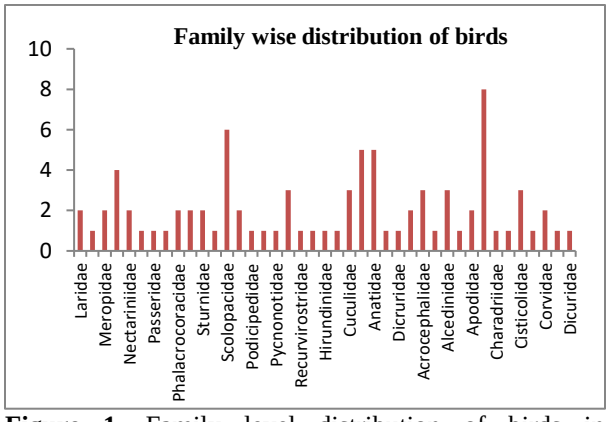

Figure 1. Family level distribution of birds in Melamadai lake.

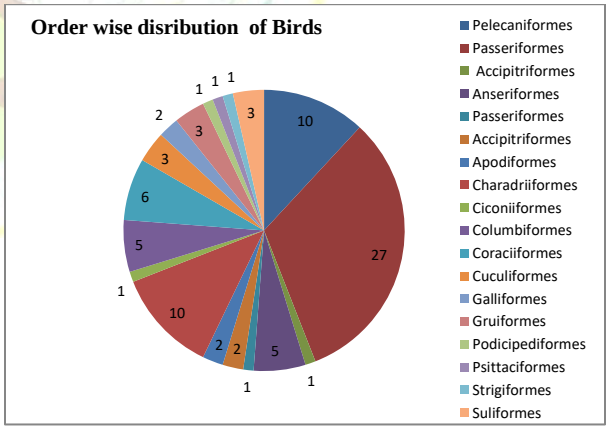

Figure 2. Order wise distribution of birds in Melamadai lake, in Madurai district, Tamil Nadu

RESULTS AND DISCUSSION

The present study revealed the occurrence of a total of 84 bird species belonging to 41 families and 18 orders from the study area. Details such as common names, scientific names, and Occurrence IUCN conservation status of the wetland birds are presented in Table 1. The order dominated list Ardeidae(8 species), Scolopacidae (6 species), Columbidae (5 species) , Anatidae

(5 species), Motacillidae (4 species), Rallidae (3 species), Acrocephalidae (3 species), Cuculidae (3 species), Cisticolidae(3 species), Alcedinidae(3 species), Meropidae (2 Species), Laridae(2 species), Nectariniidae (2 species), Apodidae(2 species), Phalacrocoracidae (2 species), Phasianidae (2 species), Threskiornithidae(2species), Sturnidae (2 species), Accipitridae (2 species), Apodidae (2 species)and Leiothrichidae. Oriolidae, Passeridae, Pelecanidae, Strigidae, Podicipedidae, Psittaculidae, Pycnonotidae, Recurvirostridae, Laniidae, Hirundinidae, Estrildidae, Corvidae, Dicruridae, Alaudidae, Anhingidae, Charadriidae, Ciconiidae, Coraciidae, Corvidae, Dicaeidae, Dicuridae Each order are recorded in one species(Figure 2) .

The family are represented in dominated list are Passeriformes (27species), Pelecaniformes (10 species), Charadriiformes (10 species), Columbiformes (5Species), Coraciiformes (6species), Anseriformes (5 species), Suliformes (3species), Cuculiformes(3 species), Galliformes (2species), Gruiformes (3species), Accipitriformes (2 species), Apodiformes (2species) and Podicipediformes, Accipitriformes, Passeriformes, Ciconiiformes, Psittaciformes, Strigiformes each familes are recorded in one species (Figure 2). (M.N Harisha *et,. al*.2018)The family Ardeidae dominated by the representation of 10 species (19%) followed by Scolopacidae with seven species (13%), Rallidae with six species (12%), Anaidae with ive species (10%), Motacillidae with four species (8%), Alcedinidae, Charadriidae, Ciconiidae with three species each, (6% each), Laridae, Threskiornithidae, Phalacrocoracidae with two species each (4% each), Podicipididae, Anhingidae, Rostratulidae, Recurvirostridae with one species each (2%) each of the total family wise frequency of occurrence of water birds community of the study area.

As per IUCN Red List (IUCN 2014.3) threatened categories, 46 species recorded from the study areas fall under the Least Concern (LC) category, which account for 90% and five species (10%) were categorized as Near Threatened (NT), (M.N. Harisha *et al* 2018).In this study recorded in Least concern(LC) 79 species and Near Threatened (NT)Five species (Table 2.The five Near Threatened species - Oriental Darter(*Anhinga melanogaster),* Pied Cuckoo-dove(*Reinwardtoena browni),* Spot-billed Pelican (*Pelecanus philippensis),* Black-headed Ibis (*Threskiornis melanocephalus) and* Painted Stork-*(Mycteria leucocephala)*- are protected under Schedule IV of the Indian Wildlife Protecion Act, 1972 (Arora 2003).

The birds were found to utilize different wetland habitats extensively for nesting, foraging and roosting on the vegetation. Due to the availability of varied sources of feed as well as foraging, the rich diversity of the birds was documented during the present study. The wetlands provides heterogeneous feeding habits to avifauna (Saika, P. K;2000).Wetland habitat by supporting different food sources like planktons, fishes and invertebrates, further adding to the diversity of the wetlands (Jules, E. S., 1997). From in this study onwards a considerable number of water birds dwell in the pond. Highest density of the birds was recorded during winter months. The basic requirement of the migratory birds at their wintering sites are adequate food supply and for their safety (Bharatha Lakshmi, B. 2006).

It is indicated that Melamadai Lake was more potential than the wetland for birds' diversity. It is realized that the birds turn out to be excellent indicator of overall biodiversity such as fishes and zooplankton and benthic fauna etc as the inhabit a broad range of habitats and elevations. Some seasonal changes in water birds' number is directly or indirectly connected to the availability of food and water physico-chemical characters.

The present study emphasizes the need for the conservation of wetlands and their biodiversity and specially the wetland migratory birds. The urgency is verified due to the international significance of these globally Near Threatened birds of importance. Hence, small urban wetlands should be also prioritized for conservation and their values should be recognized for the protection of avifauna.

So, it can be inferred from present investigation that aquatic ecosystem of lake is degrading as presence of pollution indicators forms and slowly this beautiful lake will perish or will may lost from human use.

CONCLUSIONS

The present study revealed that, though the lake is highly disturbed it still provides some potential habitats for a few migratory as well as all residents, including some threatened species which have a declining population trend by providing food and space to breed. It is the need of the hour to monitor systematically in the rapidly changing environment with a focused study on the avifauna of the region. This can be achieved only through strengthening public participation in the study of status, distribution and conservation of birds of Melamadai Lake, Madurai District, and Tamil Nadu.

CONFLICT OF INTEREST

The author here declares that there is no conflict of interest in the publication of this article.

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Citation: Selvamurugan, S. 2023. Bird diversity of in and around Melamadai Lake Madurai city, Tamil Nadu state, India; A preliminary study. *International Journal of Agricultural and Applied Sciences*, 4(1):115-119. https://doi.org/10.52804/ijaas2023.4119