

Avifaunal diversity of Thamaraiikulam pond at Theni district

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Abstract: Wetland supports a variety of faunal diversity by providing them suitable habitat along with food and water. Avifauna holds a significant place in a wetland ecosystem, so an attempt has been made to assess the avian diversity in Thamaraiikulam pond. Water birds acquire important nutrients by feeding on benthic fauna and plankton and the availability of which is influenced by physico-chemical variables. Thamaraiikulam pond favours for the high diversity of birds during the month of September 2016-May 2017. 15 species of birds were observed during this period, belonging to 11 families those hold the abundance > Phoenicopteridae > Anatidae > Ciconiidae > Rallidae > Accipitridae > Psittaculidae > Alaudidae. The dominant orders of resident water birds were, Ciconiiformes > Podicipidiformes > Pelecaniformes > Phoenicopteriformes > Anseriformes > Gruiformes. All these birds depend up on wetland flora and fauna along with the nearby crop field for their food.

Key Words: Thamaraiikulam pond, avifauna, diversity and wetland.

1. INTRODUCTION:

Mullai Periyar River is one of the longest rivers of the South India. It originates from the Sundaramalai hills in Western Ghats. The people residing in various districts of Tamilnadu and Kerala depend on the Mullai Periyar River and it is very useful to the people of Theni district. The population of Theni district is 1,245,899 depends on Mullai Periyar River. The water receives a large amount of wastes, such as industrial effluents, domestic wastes and was polluted by other anthropogenic activities. It directly receives waste from town ships like Guddalur, Surulipatti, Cumbum, Uthamapalayam, Veerapandi, Theni, Bodinayakanur and Vaigaidam. Hence it has been taken to study the bird species distribution of Thamaraiikulam pond in Theni District. It aims to enumerate the abundance and diversity of bird species at Thamaraiikulam pond during the month of September 2016-May 2017.

2. LITERATURE REVIEW:

Avifauna plays a significant role as scavengers, pollinators, predators, insect pest and bio indicators (1). They are very sensitive indicators of pollution problems and function as early warning system (2 and 3). The water level fluctuation provides more foraging opportunities and consequently supports a high species richness and abundance of water birds (4). Wetlands also have been called as 'Biological Super Market' because of the extensive food chain and rich biodiversity that support and play a major role in the landscape by providing unique habitats for a wide range of flora and fauna (5 and 6). Changes in abundance of water birds reflect the habitat changes of a tank ecosystem. Ephemeral tanks in Vavuniya district are known as habitats for rich birds' diversity during different periods of a year (7).

3. METHODOLOGY:

3.1. Study Area

Thamaraiikulam pond is located in the Gokilapuram village in Uthamapalayam Taluk of Theni District in Tamilnadu. It covers the 663ha of land surrounded by paddy fields. In the plains, the temperatures range from a minimum of 13 °C to a maximum of 39.5 °C. The district is known for its salubrious climate, hills and lake. The 2,889 km² (1,115 sq mi) District lies at the foot of the Western Ghats between 9' 39' and 10' 30' North latitude and between 77' 00' and 78' 30' of East Longitude.

The source of the water to the town is from the Mullai Periyar River. It is one of the attractions for this town. The yearlong pleasant climate is the treat for the residents and the visitors. The district receives the rainfall under the influence of both southwest and northeast monsoon. The bird census was taken from September 2016 to May 2017. Birds of the wetland may be identified up to species and counted separately. The method of total count was employed

to survey the bird population (8). In this method, the blocks were identified and the bird in the blocks were counted using a pent ax binocular and identified using physical features with the help of field guide(9 and 10).

3.2. Abiotic Factor: The temperature varied between 20⁰C to 41.6⁰C during the study period. In Theni district, the average rainfall was 197.5mm and the south west monsoon rain works out to 203mm. North East monsoon rain works out to 156mm and the average rainfall was 336 mm. During winter, the rainfall is measured to 10.2 mm.

3.3. Data Analysis

The number of species recorded is expressed as species richness (Margalef species richness). The total number of birds recorded is generally expressed as abundance of birds. Species diversity and evenness determine heterogeneous community. Evenness is a measure of the even allotment of individuals among the species. A number of indices have been used to calculate diversity. Among them, most widely used one is the Shannon-Wiener index (11) given as follows:

3.3.1 Diversity

$$H' = -\sum_{i=1}^s P_i \log_e P_i$$

$$\log_e = \ln; P_i = n_i / N$$

Where H' = Diversity

S = Number of species

Pi = Proportion of individuals of the total sample belonging to the i th number.

3.3.2 Evenness A number of indices have been used to quantify evenness component of diversity. Evenness1 is used here, which expresses the ratio of Hill's number (12).

$$\text{Evenness index1} \quad E1 = \frac{H'}{\ln(s)} = \frac{\ln(N_1)}{\ln(N_0)}$$

(Pielou1975, 1977)

3.3.3 Commonness index

The commonness of each bird species in different habitats was found out by calculating commonness index, which is the average sighting frequency of a species in one sample.

3.3.4 Dominance index

The relative dominance of each bird species in the two habitats was determined by calculating Dominance index using the following formula.

$$\text{Relative dominance} = n_i * 100 / N$$

Where n_i number of individuals in ith species

N means the total number of individual of all species seen during the study period.

4. RESULT AND DISCUSSION:

A Study was conducted from September 2016 to May 2017 to enumerate the bird species composition in Thamaraiikulam Pond. A total of 15 species represented, 9 orders of 11 families were observed (Table 1). The most dominant bird species were Little Cormorant, Little Cormorant and House Crow, the rarest bird species were Alexandrine Parakeet, Indian Pond Heron and Black Eagle (Table 2).

Table 1. Classification of recorded bird species in Thamaraiikulam pond during September 2016 -May 2017

Sl. No	Common name of the Bird Species	Scientific Name	Family	Order
1	Little Grebe	<i>Tachybaptus ruficollis</i>	Podicipididae	Podicipidiformes
2	Little Cormorant	<i>Phalacrocorax niger</i>	Phalacrocoracidae	Pelecaniformes
3	Grey Heron	<i>Ardea cinerea</i>	Ardeidae	Ciconiiformes
4	Indian Pond Heron	<i>Ardeola grayii</i>	Ardeidae	Ciconiiformes
5	Cattle Egret	<i>Bulbulcus ibis</i>	Ardeidae	Ciconiiformes
6	Little Egret	<i>Egretta garzetta</i>	Ardeidae	Ciconiiformes
7	Large Egret	<i>Casmerodius albus</i>	Ardeidae	Ciconiiformes

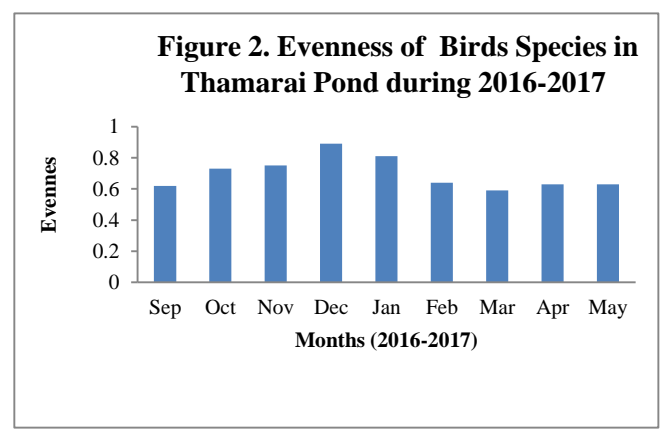
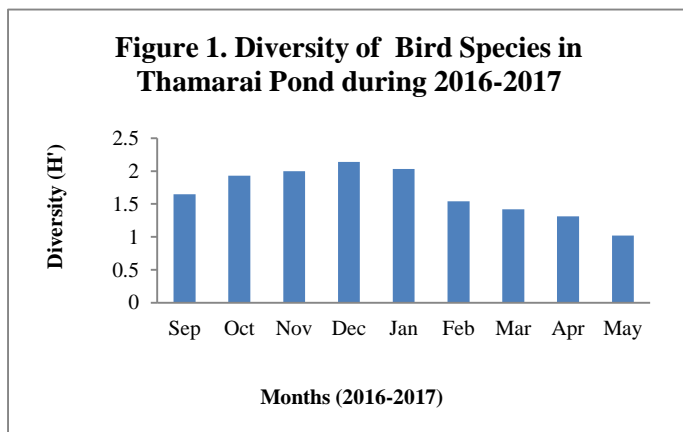
8	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Ciconiidae	Ciconiiformes
9	Lesser Flamingo	<i>Phoenicopterus minor</i>	Phoenicopteridae	Phoenicopteriformes
10	Bar-headed Goose	<i>Anser indicus</i>	Anatidae	Anseriformes
11	Black Eagle	<i>Ictinaetus malayensis</i>	Accipitridae	Falconiformes
12	Common Coot	<i>Fulica arta</i>	Rallidae	Gruiformes
13	Alexandrine Parakeet	<i>Psittaculata eupatria</i>	Psittaculidae	Psittaciformes
14	Singing Bush Lark	<i>Mirafra cantillans</i>	Alaudidae	Passeriformes
15	House Crow	<i>Corvus splendens</i>	Corvidae	Passeriformes

Table 2. Distribution of bird species in Thamaraikulam pond during September 2016-May 2017

S. No.	Bird Species	Total number of birds
1	Alexandrine Parakeet	24
2	Bar-headed Goose	94
3	Black Eagle	37
4	Black-necked Stork	83
5	Cattle Egret	222
6	Common Coot	72
7	Gray Heron	38
8	House Crow	815
9	Indian Pond Heron	106
10	Large Egret	104
11	Lesser Flemingo	102
12	Little Cormorant	546
13	Little Egret	286
14	Little Grebe	787
15	Singing Bushlark	46

4.1 Bird Species Diversity and Evenness

Common and scientific names of the birds were given by Manakadan and Pittie (13). The bird species diversity was high in December followed by January and it was low in May (Figure 1) the same result was reported by Nazeema Mohamed Ali and Nirmala Thivyanathan (14) in Dindigul. Diversity was low in May with the lowest equitability. The bird species evenness was high in December and January and it was low in March (Figure 2). The variation in bird species diversity and bird species evenness may be due to the influx of anthropogenic activities (visitors, vehicles and local people) around the area and availability of food to the birds (15).



4.2 Bird Species Abundance and Richness

Temporal distribution of bird species in Thamaraikulam pond during September 2016-May 2017 showed high in September followed by October and was low in the other months gradually and lowest in April due to scarcity of water and drying up of the pond (Figure 3). The number of bird species was high in December followed January. The least number of bird species was observed in April and May (Figure 3). This may be due to the decreasing level of water as in the report of (16, 17, 18, and 19). Overall abundance patterns were reflected by the average number of aquatic birds and number of species surveyed each month. The maximum bird species richness was observed in September followed by October (Figure 4) because of the availability of prey categories as in the study of (20) and water level. The bird species richness was very low in April and May because of low water level as reported by (21 and 14).

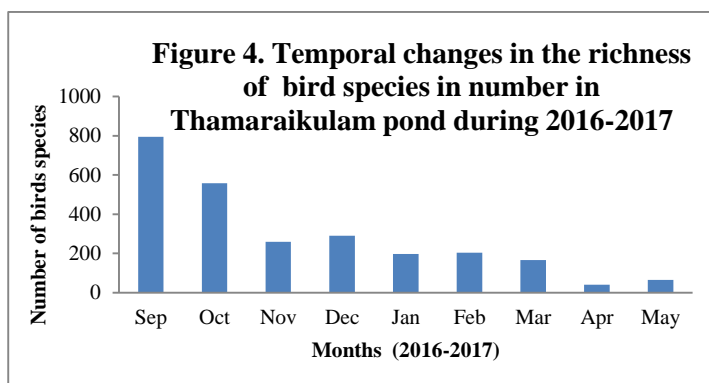
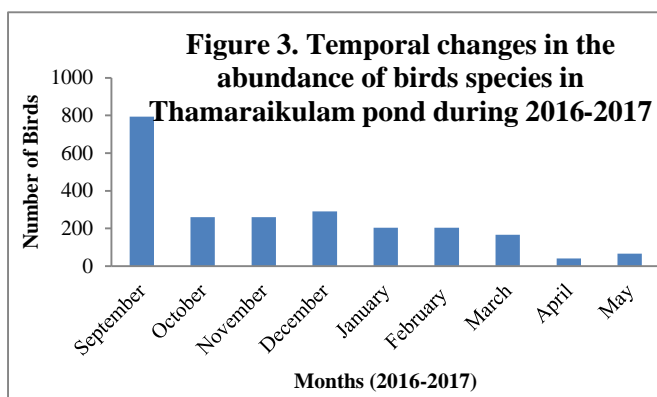


Table 3. Status of birds based on their presence in Thamaraikulam pond during September 2016-May 2017

Parameter	Maximum	Minimum	Mean	SD
Diversity	2.15	1.02	1.58	0.7918
Evenness	0.89	0.59	0.79	0.2121
Richness	15	4	1.5	0.7071
Abundance	815	24	417	533.15

In this pond, the maximum diversity of species was observed 2.15 and minimum was 1.02, where as the maximum evenness of bird species was observed 0.89 and minimum was 0.59. The maximum Richness of bird species was observed 15 and minimum was 4. The maximum abundance of bird species was observed >800 and minimum was 24 (Table 3). Different result has been reported by Meena (17) with low diversity ($H' - 1.13$) but the number of species was higher than the present study.

4.3 Common Birds Species or commonness index

The House Crow, Little Grebe and Little Cormorant were the most abundant bird species in Thamaraikulam pond (Table 4). The least common birds were the Alexandrine Parakeet, Black Eagle, Grey Heron and Singing Bush Lark. The next five species which has ≥ 10 was Bar-headed Goose, Lesser Flamingo, Large Egret, Indian Pond Heron, Common Coot, Black Necked Stork, Cattle Egret and Little Egret. Large Egret and Little Egret are the common species in the study of Meena (17) in the same pond during 2006-2007.

S. No	Birds Name	Commonness Index
1	House Crow	90.6
2	Little Grebe	85.4
3	Little Cormorant	60.6
4	Little Egret	31.7
5	Cattle Egret	24.6
6	Black Necked Stork	16.6
7	Common Coot	14.4
8	Indian Pond Heron	11.7
9	Large Egret	11.5
10	Lesser Flamingo	11.3

11	Bar-headed Goose	10.4
12	Singing Bush Lark	9.2
13	Grey Heron	7.6
14	Black Eagle	7.4
15	Alexandrine Parakeet	4.8

4.4 Dominant Birds Species or Dominance index

The most dominant bird species in Thamaraikulam pond were House Crow, Little Cormorant and Little Grebe (Table 5). The bird species which have >1 as their dominance index were Large Egret, Little Egret, Cattle Egret, Lesser Flamingo and Bar-headed Goose. The remaining species hold the least dominance index. Large Egret, Little Egret and Grey Duck are the dominant species in the study of Meena (17) in the same pond during 2006-2007 and recorded totally 16 species.

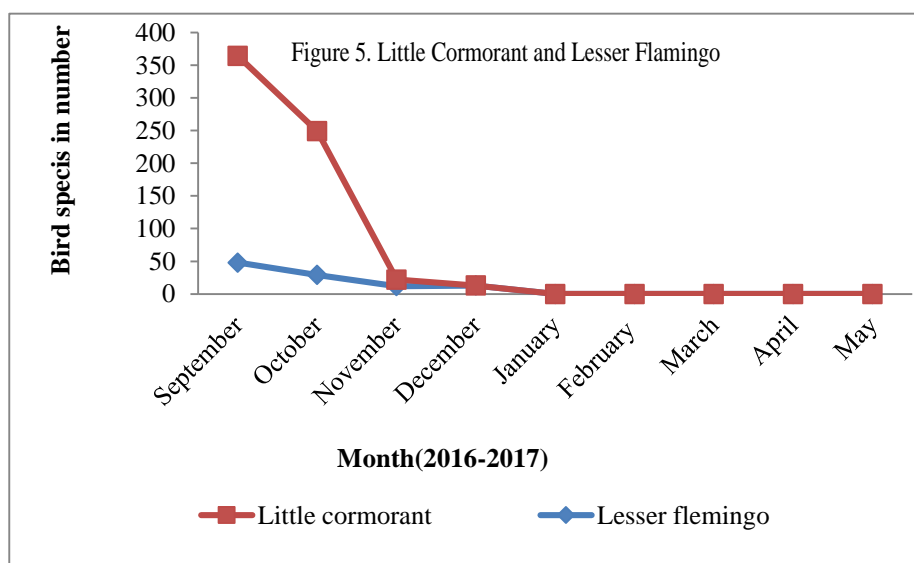
Table 5. Dominant Bird Species (Dominance Index)

S. No	Birds Name	Dominance Index
1	House Crow	15.2
2	Little Cormorant	11.7
3	Little Grebe	14.3
4	Bar-headed Goose	8.7
5	Lesser Flamingo	8.2
6	Cattle Egret	8.2
7	Little Egret	7.3
8	Large Egret	3.3
9	Common Coot	0.09
10	Indian Pond Heron	0.07
11	Singing Bush Lark	0.06
12	Grey Heron	0.05
13	Black Eagle	0.04
14	Alexandrine Parakeet	0.03
15	Black-necked Stork	0.01

4.5 A few select species distribution of Birds in Thamaraikulam pond

4.5.1 Little Cormorant

Phalacrocorax niger was found in the Thamaraikulam pond (Figure 5). Smaller size comparatively shorter, stouter bill, domed forehead, longer tail and absence of yellowgular skin distinguished it from the Shag. It was high in September and October and it was absent in January to May. It normally prefers fish as its food (22).



4.5.2 Lesser Flamingo

Phoenicopterus minor was found in the Thamaraikulam pond (Figure 5). It was high in the month of September and it was absent in January to May. It was white and pink color; it prefers fish and crabs (23).

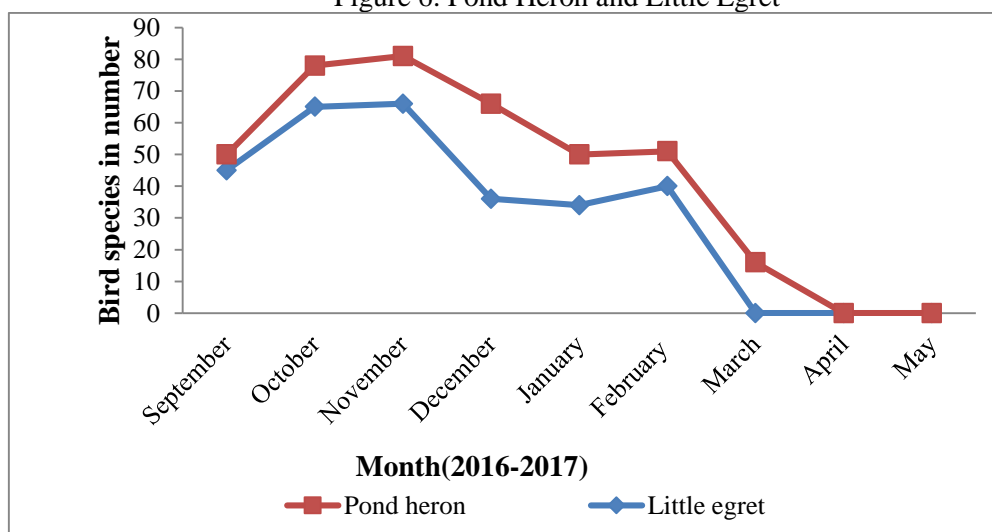
4.5.3 Indian Pond Heron

Ardeola grayii was recorded during the study period in 2016-2017. It was found maximum in December and least in September (Figure 6). An Egret like water side bird largely snow white and prominent when in flight, effectively camouflaged earthy brown when at rest. It feeds fish, crabs and insects (23).

4.5.4 Little Egret

Egretta garzetta was found in large number during the month of November followed by October. It was low in the month of January (Figure 6). This seems to be unlike the result of (17 and 22). The Egrets preferred this area for foraging and roosting. It feeds on insects, fish, frogs and small reptiles (23).

Figure 6. Pond Heron and Little Egret



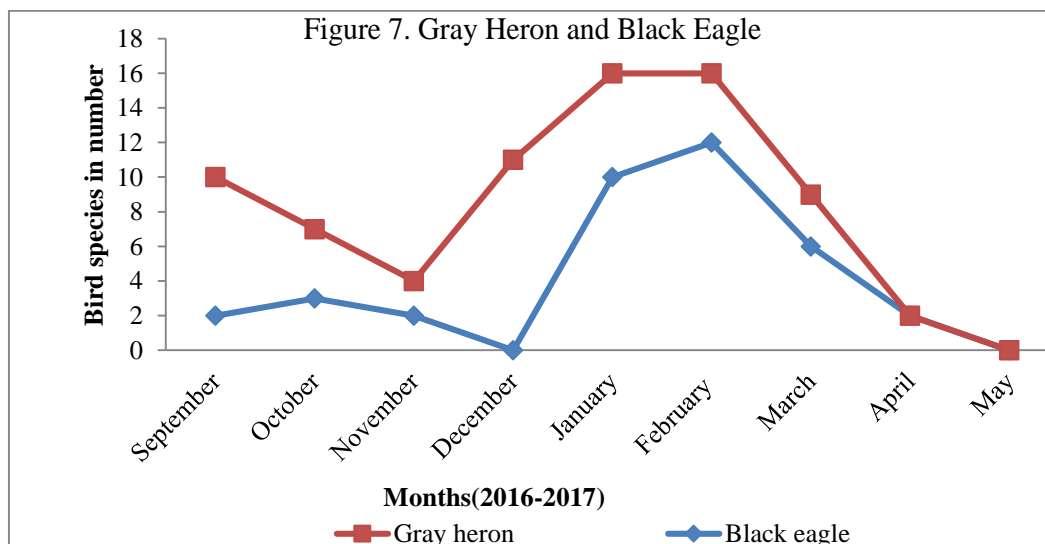
4.5.6 Grey Heron

Ardea cinerea was found in the Thamaraikulam pond (Figure 7). It was high in the month of December and January and minimum number of birds was recorded in the month of April.

4.5.7 Black Eagle

Ictinaetus malayensis was found in the Thamaraikulam pond (figure 7). It was high in the month of February and low in the month of May was recorded (23).

Figure 7. Gray Heron and Black Eagle



5. Abiotic factor: The temperature varied between 20 °C to 41.6 °C during the study period. The highest maximum temperature was observed in the month of September at 41.6°C and the lowest maximum temperature was observed at 30 °C in January. The highest minimum temperature was observed in the month of September 31.6 °C and the lowest minimum temperature was observed in January at 16 °C (Table 6). In aquatic system, temperature plays a vital role in physiochemical and biological behavior of organism. Temperature has great impact on various activities of aquatic life such as, sexual maturity, breeding season, metabolism, growth and respiration etc. (24).

Months	Maximum Temperature (°C)	Minimum Temperature (°C)
September	41.6	31.6
October	34	21
November	34	29
December	33	22
January	30	16
February	34	20
March	38	21
April	39	24
May	39.8	24.8

5. CONCLUSION:

The present study was designed to enumerate bird species composition and diversity in Thamaraiikulam pond in Theni district from September 2016 to May 2017. Bird census was carried out, using total count method. In Thamaraiikulam pond 15 species of birds which are grouped under 11 families and 9 orders.

Species recorded in Thamaraiikulam pond was high during September followed by October and January. The maximum diversity and equability was recorded in January and low in April and May. The most dominant as well as common species in Thamaraiikulam pond was House Crow, Little Grebe and Little Cormorant. Water bird species seen abundantly in the study area were Little Cormorant, Egret species and Lesser Flamingo. The least number of bird species observed were Alexandrine Parakeet and Black Eagle.

Based on these results, it is concluded that the Thamaraiikulam pond provides good habitat for them especially in terms of vegetation and food resource. These areas provide optimal combination of resources that allow bird species to fulfill their biological needs such as food, water, cover, forage and roost. Breeding of birds species in this pond can be studied extensively in future.

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