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Wetland Bird Species Composition in Tannery Effluent Tank, Dindigul, Tamilnadu, India

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Abstract

The research paper was designed to enumerate bird's species composition in the tannery effluent tank, Dindigul district. Bird census was carried out, using total birds from December 2009 to April 2010. The study area harbored eleven species of birds which is grouped under eight families and six orders. Species recorded in the tannery effluent tank were high during January and February. The maximum diversity with high equitability was recorded in December and minimum in April. The most dominant as well as common species in tannery effluent tank is Black-winged Stilt and Little Egret. The maximum diversity with high equitability was recorded in December and minimum in April The maximum abundance of birds species recorded in the study area was from the family Charadridae and Ardeidae whereas the remaining six families showed single species. The maximum abundance was recorded in the order Charadriiformes and Ciconiiformes and the minimum abundance was recorded in the order Galliformes and Pelecaniformes.

Keywords: Tannery effluent tank, wetland, dindigul, bird species.

Introduction

Wetlands are widely recognized as fragile ecosystems with diverse attributes including a distinctive avifauna[1]. Wet lands are highly important because they serve as critical breeding, staging and wintering grounds for wide array of globally important bird species[2].

Smaller wetland maintained higher water bird density and diversity than larger ones[3]. Wetlands are the most valuable ecosystems in the world and are useful for improving water quality and storing flood waters and releasing it slowly at they travel down-stream[4,5]. Moreover wetlands provide habitat for wild life and open space to promote recreation[6].

India being a megadiversity centre, harbours 1,200 species of birds which amounts to 13 percent of the bird species of the world 9,600 species[7]. The relationship between habitat structure and wetland bird assemblages is centered on habitat extension effects on the community structure[8,9]. Moreover wetlands provide habitat for wild life and open space to promote recreation[6].

Wetlands are important environments for birds due to their habitat diversity and high productivity have led to increasing concern about the impact of their loss[10]. Variation in habitat condition may also cause changes in relative abundance of bird species composition[11,12].

Pollution of the environment is one of horrible ecological crisis to which they are subjected today. Most of the activities of man has created adverse effects on all living organisms in the biosphere, thus the pollution is generally defined as "The addition of the constituents to water, air or land, which adversely alter the natural quality of the environment". The source of water pollutants are domestic sewage, detergents, pesticides, chemicals, metals and industrial effluents through various operations[13]. Water pollution by tannery wastes in Tamil Nadu is very severe and there is large number of tanneries in the state and the wastewater from the industry has caused considerable damage to water sources, affecting drinking water supply and irrigation. The groundwater in large areas has become unsuitable for domestic and irrigation purposes due to contamination from these wastes[14].

Dindigul is one of the major industrial and commercial towns of Tamil Nadu and is the headquarters of Dindigul district. The tanneries which do not have effluent treatment plants discharge the untreated effluents laden with salts and other pollutants like chromium, lead etc. in large amounts indiscriminately in to the open lands, pits, channels, tanks and in low-lying areas. Lagooning of tannery wastes, or spreading on land for evaporation, together with the solid wastes has led to the contamination of ground water.

Objectives: To enumerate the bird species from wetland of tannery effluent tank, Dindigul. To determine the bird community structure in tannery effluent tank.

Methodology

Study Area: Dindigul is a town and municipality in Sothern part of Tamil Nadu state, India. Also this city is known for leather tanning industry. Tanning waste water was collected

near the industry and it looks like a pond.

The bird census was taken from December 2009 to April 2010. The method of total count was employed to survey the bird population[15]. In this method, the blocks were identified and the bird in the blocks were counted using a (7x50) pentax binocular and identified using physical features with the help of field guild. The total area was covered by 16 acres and it is filled with *Prosopis juliflora, Sagitifolia, Aerva lanata* plants. Its tender and cool climate of nature attracts the birds. Birds were recorded during the study period. The census was made thrice a month and recorded for data analysis.

Results and Discussion

A study was conducted from December 2009 to April 2010 to enumerate the bird species composition in the tannery effluent tank. A total of eleven species represented, 6 orders of 8 families were observed. The results showed that the most dominant bird species were Black-winged Stilt followed by Little Egret, Grey Duck and Greenshank. The rarest bird species were Pond Heron, Little Cormorant, Spotted Redshank, Common Scandpiper, Red-rumped Swallow, Painted Stork and Grey Patridge.

The number of species was high in January followed by February and December. The least number of bird species was observed during the month of April and March (figure-1). Bird abundance was high in February followed by January. The abundance was very low in April due to the high water inflow and migratory bird (figure-2). The same result was reported by Vijayan and Meena S.[16,17].

The Bird species diversity was high in December with high evenness or equitability recorded in December and the minimum in April (figure-3 and 4). This showed that the species there equally distributed in December than in January. Diversity was low in April with lowest equitability.

The maximum species richness was observed in January and February because of the availability of Prey categories as in the study of Nilsson G.E. and Nilsson I.N.[18] during this month. The species richness was very low in April followed by March. Because of low water level[19].

Species Diversity and Evenness: In tannery effluent tank, the maximum bird species diversity observed was 1.36 and the minimum was 1.04 (table-8), whereas the maximum bird species evenness was 0.151 and the minimum was 0.094. The maximum bird abundance was 1808.7 and the minimum abundance was 1134.2. The maximum species richness was 11 and the minimum was 7.

Water Birds of the Tannery Lagoon: Black-winged Stilt: *Himantopus himantopus* was recorded in all the months from December to April. The Black-winged Stilt is a dominant species as it was recorded high in numbers. The maximum abundance of species shows in January followed by February and December. It was low in March followed by April (Figure 6). It is mostly seems in lagoons and reservoirs. It is a resident species. It feeds mostly on insects, worms and molluscs.

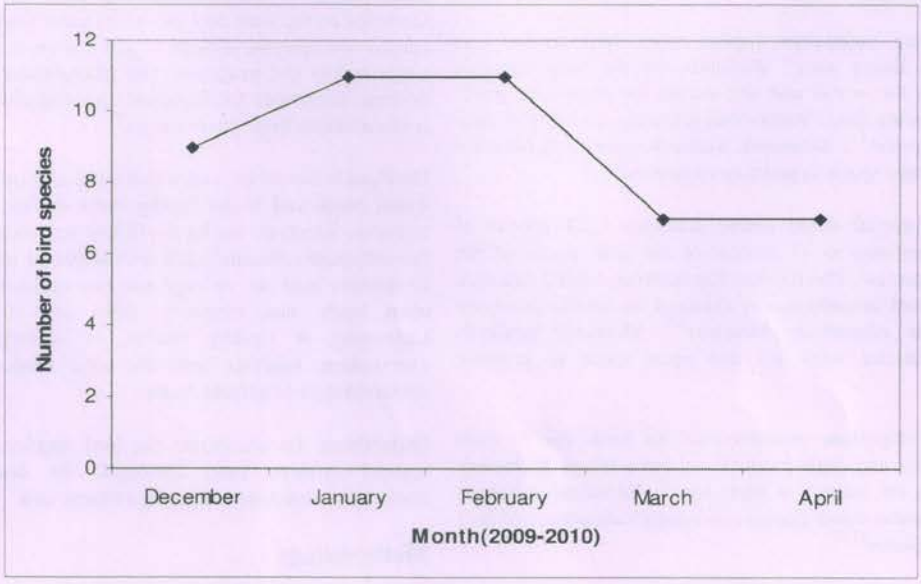

Figure-1
Species Richness of Bird Species from the Tannery Effluent Tank

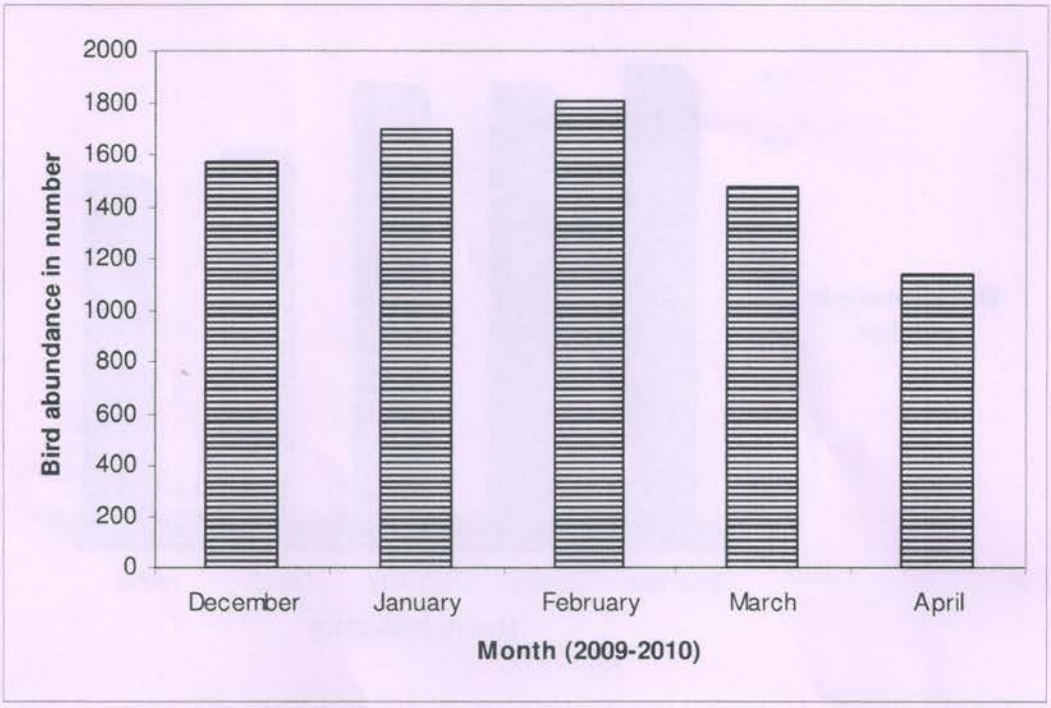

Figure-2
Abundance of Bird Species from the Tannery Effluent Tank

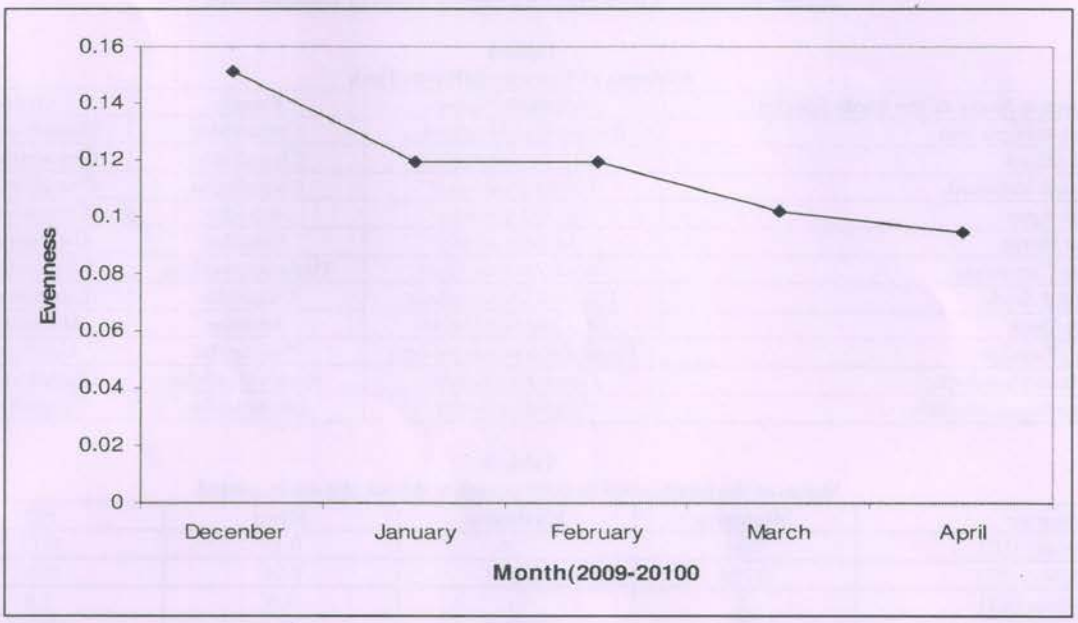

Figure-3
Diversity of Bird Species from the Tannery Effluent Tank

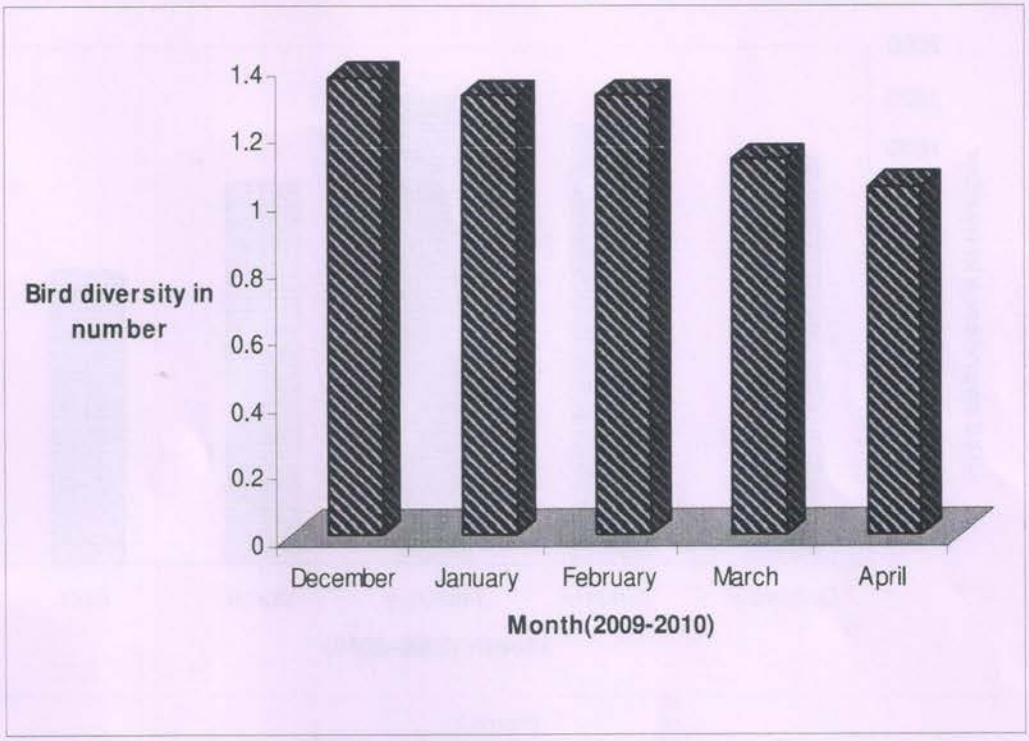

Figure-4
Species Richness of Bird Species from the Tannery Effluent Tank

Table-1
Avifauna of Tannery Effluent Tank

Common Name of the Birds Species	Scientific Name	Family	Order
Black-winged Stilt	*Himantopus himantopus*	Charadridae	Charadriiformes
Greenshank	*Tringa nebularia*	Charadridae	Charadriiformes
Spotted Redshank	*Tringa erythropus*	Charadridae	Charadriiformes
Little Egret	*Egretta garzatta*	Ardeidae	Ciconiiformes
Pond Heron	*Ardeola garyii*	Ardeidae	Ciconiiformes
Little Carmorant	*Phalacrocorax niger*	Phalacrocoracidae	Pelecaniformes
Painted Stork	*Mycteria leucocephala*	Ciconiidae	Ciconiiformes
Grey Duck	*Anas poecilorhyncha*	Anatidae	Anseriformes
Grey Patridge	*Francolinus pondicerianus*	Phasianidae	Galliformes
Common Sandpiper	*Tringa Hypoleucos*	Recurvirostridae	Charadriiformes
Red-rumped Swallow	*Hirundo daurica*	Hirundinidae	Passeriformes

Table-2
Status of the birds based in their presence during the study period

Parameter	Minimum	Maximum	Mean	SD
Diversity (H')	1.04	1.36	0.11	0.13
Evenness (E1)	0.094	0.151	0.01	0.02
Richness (R1)	7	11	1.6	2.0
Abundance	1134.2	1808.7	188.14	258.94

Abundance of Birds in Tannery Lagoon from December 2009 to April 2010

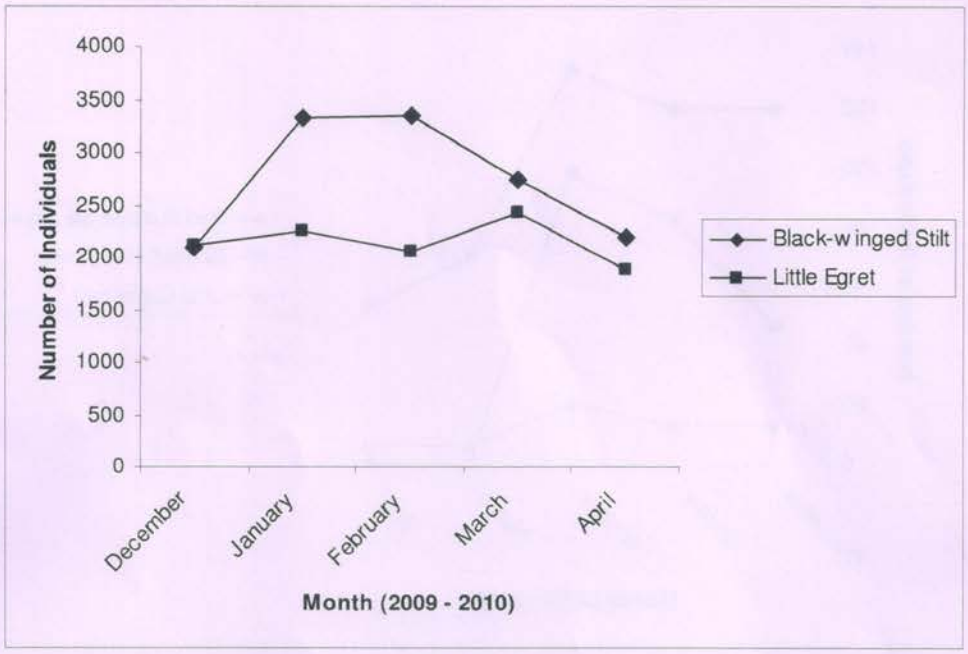

Figure-6
Black-winged Stilt, Little Egret

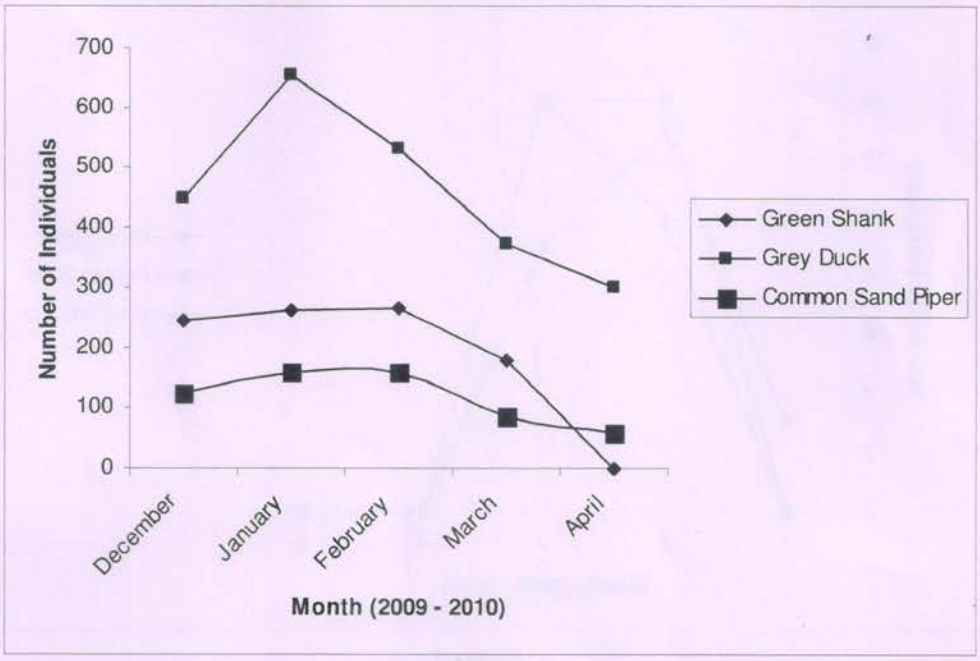

Figure-7
Greenshank, Grey Duck, Common Sandpiper

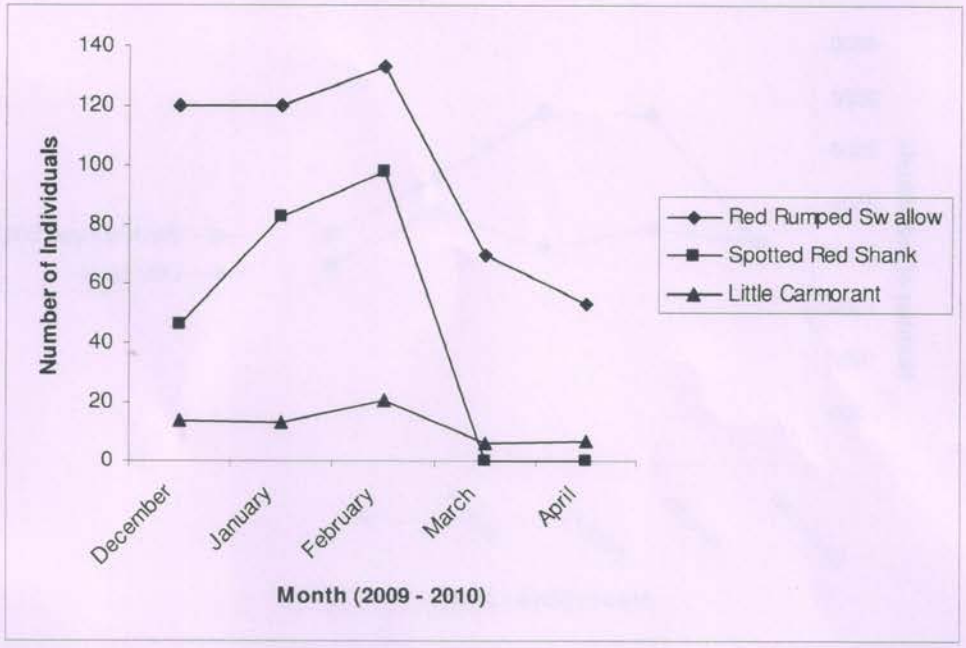

Figure-8
Red-rumped Swallow, Spotted Redshank, Little Carmorant

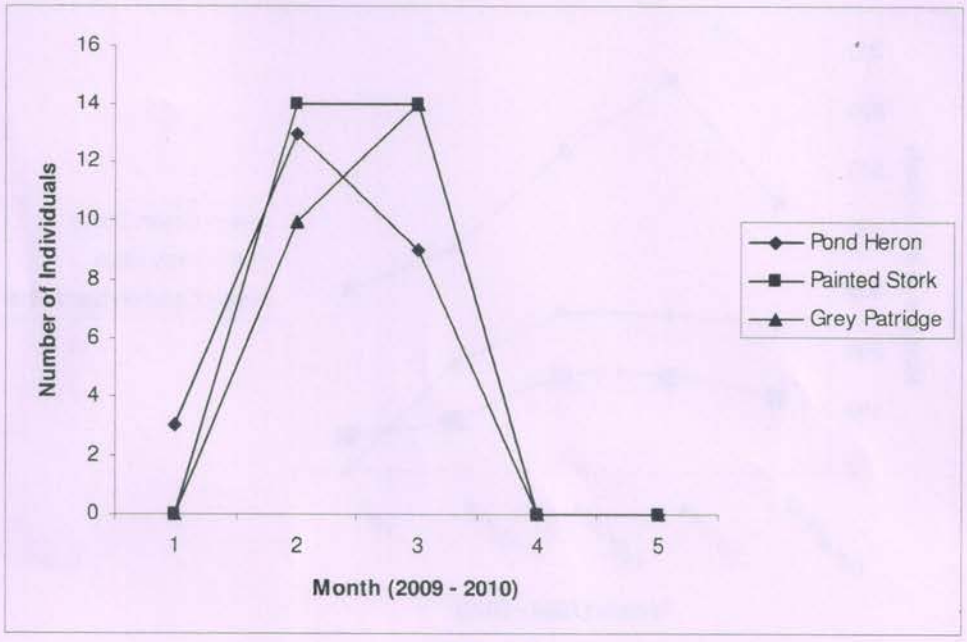

Figure-9
Pond Heron, Painted Stork, Grey Patridge

Little Egret: *Egretta garzetta* was found in remarkable number in the tannery effluent tank. The Little Egrets was found in large number during the month of March followed by January, December and March. It was very low in April (figure-6). This seems to be unlike the result of[20,17]. The egrets preferred this area only for roosting. It feeds on insects, fish, frogs and small reptiles.

Greenshank: *Tringa nebularia* was observed from December to March. The abundance was high in January followed by February and December and low in March and totally absent in April (figure-7). It is a migratory bird. It feeds on insects and other invertebrates, tadpoles, even frogs.

Grey Duck: *Anas poecilorhyncha* was recorded throughout the study period in tannery effluent tank. This species showed high in abundance during January followed by February and December. It was low in March followed by April (figure-7). It is a resident and locally migrant bird. It feeds chiefly a vegetable matter.

Common Sandpiper: *Tringa hypoleucos* was observed high during February followed by January and December and it was low in March followed by April (figure-7). It is locally resident and migrant bird. They can avail the food easily by probing into the mud. It feeds on insects, worms and molluscs.

Red-rumped Swallow:*Hirundo daurica* was observed high in February followed by December, January and March. It was low in April (figure-8). It is locally resident and migratory bird. It feeds on chiefly flies and midges.

Spotted Redshank: Trsinga erythropus was estimated high in February followed by January and low in December. It was totally absent in March and April (Figure 8). It is locally migrant. It feeds on worms, aquatic invertebrates, insects and larvae.

Little Carmorant: *Phalacrocorax niger* was found in the study area and it was high in February 2009 followed by December and it was low in number January followed by March and April 2010 (figure-8). It normally prefers fish as their food[22].

Pond Heron: *Ardeola grayii* was a resident bird, found very few in number. It was high in January followed by February and it was low in December and totally absent in March and April (figure-9). It feeds frogs, fish and insects.

Painted Stork: Surprisingly *mycticorax nycticorax* which was cited in the study area in the third week of January 2010 and they were stayed there upto third week of February 2010 and was not observed thereafter. They were few in number (figure-9). It is a resident and local migratory species[23]. It feeds on fish, frogs and snakes.

Grey Patridge: *Francolinus Pondicerianus* was noted from third week of January 2010 upto second week of February 2010 and it was totally absent till April 2010 due to local displacement (figure-9). Although it is a resident species, it was not recorded after the second week of February. It feeds on grains, seeds, termites and beetle larvae.

Abiotic factors: Temperature varied between 20^0C to 37^0C during the study period.

In Dindigul district, the average rainfall was 247.5mm and in South west monsoon rain works out to 251.4mm. North east monsoon rain works out to 399.2 mm and the average rainfall was 741.2mm. During winter the rainfall measured to 12.7mm. The study area harboured a variety of plants species. The plant species were collected and preserved. The dominant shrub species was *Presobius julliflora*. The dominant herb species was *Sagitifolia, Aerva lanata* and *Acalpha indica.*

Conclusion

The present study was designed to enumerate bird's species composition in the tannery effluent tank, Dindigul district. Bird census was carried out, using total birds from December 2009 to April 2010. The study area harbored eleven species of birds which is grouped under eight families and six orders. Species recorded in the tannery effluent tank were high during January and February. The maximum diversity with high equitability was recorded in December and minimum in April. The most dominant as well as common species in tannery effluent tank is Black-winged Stilt and Little Egret. ,Water bird species seen abundantly in the study area were Black-winged Stilt, Little Egret, Grey Duck, Greenshank, Common Sandpiper and Red-rumped Swallow. The least number of bird species observed was Painted Stork, Pond Heron, Grey Patridge, Little Carmorant and Spotted Redshank.

The maximum abundance of birds species recorded in the study area was from the family Charadridae and Ardeidae whereas the remaining six families showed single species. The maximum abundance was recorded in the order Charadriiformes and Ciconiiformes and the minimum abundance was recorded in the order Galliformes and Pelecaniformes. Abiotic and biotic factors such as temperature, rainfall, plants, soil and water also influenced in determining diversity, abundance and richness of birds in the study area. The temperature is maximum in April and minimum in January. The plants species collected from the tannery effluent tank were four.Most of the bird species were resident migrant followed by resident and the migrant. Other birds around the study area were Common Myna, White Headed Babler, House Crow, Purple Sunbird, House Sparrow, Blyth's Leaf Warbler and Black Drongo.

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