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Diversity of Water birds in Koothapar Periyakulam Wetland in Tiruchirappalli District, Tamil Nadu, India

Teneson R. and Ravichandran C.
Department of Environmental Sciences, Bishop Heber College, Tiruchirappalli, Tamil Nadu, INDIA

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Abstract

The present study was undertaken to study the diversity of waterbirds in Koothapar Periyakulam wetland during August 2013 to July 2014. Fourty three species of waterbirds were observed in the wetland which belongs to 7 orders and 14 families. Five thousand six hundred and seventy one individual numbers of waterbirds and 33 species were recorded during December 2013. Water birds belong to the order: Peliconiformes, Charadriiformes, Anseriform, Gruiformes and of the families: Ardeidae, Anatidae, Rallidae, Scolopacidae, Threskiornithidae were recorded with high number of species in the wetland. "Threatened" and "near threatened" species were also recorded. This study reveals that Koothapar Periyakulam wetland acts as a refuge site for many waterbirds including wader, waterfowl and many migratory and threatened species. Hence, it is recommended that protection of the wetland from the human disturbance is of urgent need.

Keywords: Ecosystem, macro flora, migratory bird, productivity, wader and water fowl.

Introduction

Waterbirds and wetlands are inseparable elements[1]. Birds inhabiting wetlands for feeding, breeding, nesting or roosting are broadly defined as water birds[2]. These waterbirds are essential component of the food web and nutrient cycles of the wetland ecosystems[3]. Abundance of waterbirds in a particular wetland mainly depends on availability of food, nesting sites and predation risk[4]. It is considered as a good bioindicators and useful models of the wetlands for studying the various environmental problems[5].

Wetlands are the main custodians of the water birds[6,7]. Due to high nutritional value and productivity, it attracts the huge number of migratory and resident bird species[8]. Among the various habitats, wetlands are considered as one of the most threatened one in the world[9]. During the last century the world has lost over 50% of wetlands due to various human influences, and the remaining of them have been declined because of various human activities[10]. Wetlands in India face tremendous anthropogenic pressure mainly due to discharging of domestic sewage, discharging of industrial effluent, dumping of solid waste, over exploitation of their natural resources and conversion of wetlands in to barren lands. This resulted in biodiversity loss and disturbance of the wetland services[11]. A recent study has shown about 38% loss of inland wetland in India during 1971 to 2001[12]. This loss of wetlands has dangerously reduced the availability stop over sites for migrating birds and has increased the importance of remaining wetlands to migrants as well as nesting species[12]. Changes in the habitat condition may affect the relative abundance of bird species composition[13]. However, studying of waterbirds in a wetland are excellent indicators of water quality and measures of biodiversity. As no detailed study on waterbirds of Koothapar Periyakulam wetlands is available, this study was undertaken to determine the diversity of the waterbirds.

Study Area: Koothapar Periyakulam (10°47'50"N; 78°46'16"E) is one of the important seasonal wetland which supplies water for irrigation. It acts as a feeding and breeding ground for many waterbirds and wetland dependent birds. In 1998, this wetland was prioritized as an important one by SAACON[14]. It is about 15 Km far away from Tircuhirappalli, Tiruchirappalli district, Tamilnadu, India (figure-1). This wetland receives water from Uyyakondan channel, the distributary of river Cauvery. The total area covering of the wetland is 74 hectares. Fish farming is another use of the wetland. *Eichornia crassipes* was the dominant macro flora covering the wetland. Hunting, fishing, open defecation, sewage discharging, solid waste dumping are the common human activities found in and around the wetland.

Material and Methods

The present study was carried out from August 2013 to July 2014. Birds were recognised in the field by using Bushnell (12x50 mm) binoculars and various field guides[15-18]. Birds were counted by the "direct count" and "total count" methods. In "direct count" method a suitable vantage point was selected and all the visible birds were counted. Another method "total count" was used wherever possible, by walking around the wetlands or from specific vantage points to count the birds. Systematically this survey was conducted in morning around 6.00 hrs to 10.00 hrs. Water depth was measured by the help of wooden scale. The water and atmospheric temperature was measured by using thermometer and sling psychrometer.

Results and Discussion

The list of observed waterbirds and their details are presented in the table–1. Monthly variations of individual waterbirds and their species richness are present in the figures-2 and 3. Percentage of various ecological groups, residential groups, feeding groups are presented in the figures-4 to 6. Water depth and temperature are presented in the figures-7 and 8.

Table–1
Water birds present in Koothapar Periyakulam wetland

Common Name	Scientific Name	Order	Family	Status	Feeding Habits	Ecological Group
Grey heron	*Aredea cinerea* (Linnaeus, 1758)	Pelecaniformes	Ardeidae	LM	CV	Wader
Purple heron	*Ardea purpurea* (Linnaeus, 1766)	Pelicaniformes	Ardeidae	LM	CV	Wader
Purple moorhen	*Porphyrio porphyrio* (Linnaeus, 1758)	Gruiformes	Rallidae	R	OM	Swimmer
Large egret	*Ardea alba* (Linnaeus, 1758)	Pelicaniformes	Ardeidae	LM	CV	Wader
Little cormorant	*Microcarbo niger* (Vieillot, 1817)	Pelicaniformes	Phalacrocoracidae	LM	CV	Diver
Indian pond heron	*Ardeola grayii* *(Sykes,1832)*	Pelicaniformes	Ardeidae	R	CV	Wader
Pheasant – tailed jacana	*Hydrophasianus chirurgus* (Scopoli, 1786)	Charadriiformes	Jacanidae	R	OM	Wader
Median egret	*Mesophoyx intermedia* (Wagler, 1827)	Pelecaniformes	Ardeidae	RM	P	Wader
Common red shank	*Tringa totanus* (Linnaeus, 1758)	Charadriiformes	Scolopacidae	RM	IN	Wader
Black headed ibis	*Threskiornis melanocephalus* (Latham, 1790)	Pelecaniformes	Threskiornithidae	RM	IN	Wader
Black winged stilt	*Himantopus himantopus* (Linnaeus, 1758)	Charadriiforme	Recurvirostridae	R	IN	Wader
Red wattled lapwing	*Vanellus indicus* (Boddaert, 1783)	Charadriiformes	Charadriidae	R	IN	Wader
Great cormorant	*Phalacrocorax carbo* (Linnaeus, 1758)	Pelecaniformes	Phalacrocoracidae	LM	CV	Swimmer

Common Name	Scientific Name	Order	Family	Status	Feeding Habits	Ecological Group
Indian sagh	*Phalacrocorax fuscicollis* (Stephens, 1826)	Pelecaniformes	Phalacrocoracidae	RM	P	Swimmer
Painted stork	*Mycteria leucocephala* (Pennant, 1769)	Ciconiiformes	Ciconiidae	RM	P	Wader
Common teal	*Anas crecca* (Linnaeus, 1758)	Anseriformes	Anatidae	M	HE	Swimmer
White - breasted water hen	*Amaurornis phoenicurus* (Pennant, 1769)	Gruiformes	Rallidae	R	OM	Wader
Little grebe	*Tachybaptus ruficollis* (Pallas, 1764)	Podicipediformes	Podicipedidae	R	IN	Diver
Darter or snake bird	*Plotus anhinga* (Linnaeus, 1766)	Suliformes	Anhingidae	LM	CV	Diver
Common coot	*Fulica atra* (Linnaeus, 1758)	Gruiformes	Rallidae	LM	OM	Diver
Spot bill duck	*Anas poecilorhyncha* (Forster, 1781)	Anseriformes	Anatidae	LM	HE	Swimmer
Northern pintail duck	*Anas acuta* (Linnaeus, 1758)	Anseriformes	Anatidae	M	HE	Swimmer
Lesser whistling duck	*Dendrocygna javanica* (Horsfield, 1821)	Anseriformes	Anatidae	R	OM	Swimmer
Glossy ibis	*Plegadis falcinellus* (Linnaeus, 1766)	Pelecaniformes	Threskiornithidae	RM	IN	Wader
Common tern	*Sterna hirundo* (Linnaeus, 1758)	Charadriiformes	Sternidae	LM	CV	Aerial forager
Marsh sand piper	*Tringa stagnatilis* (Bechstein, 1803)	Charadriiformes	Scolopacidae	M	IN	Wader
Common green shank	*Tringa nebularia* (Gunnerus, 1767)	Charadriiformes	Scolopacidae	M	IN	Wader
White bellied heron	*Ardea insignis* (Hume, 1878)	Pelecaniformes	Ardeidae	M	CV	Wader
Common moorhen	*Gallinula chloropus* (Linnaeus, 1758)	Gruiformes	Rallidae	WM	OM	Swimmer

Common Name	Scientific Name	Order	Family	Status	Feeding Habits	Ecological Group
Northern shoveller	*Anas clypeata* (Linnaeus, 1758)	Anseriformes	Anatidae	WM	OM	Swimmer
Spot billed pelican	*Pelecanus philippensis* (Gmelin, 1789)	Pelecaniformes	Pelecanidae	M	P	Swimmer
Eurasian Spoon bill	*Platalea leucorodia* (Linnaeus, 1758)	Pelecaniformes	Threskiornithidae	M	IN	Wader
Asian-open billed stork	*Anastomus oscitans* (Boddaert, 1783)	Ciconiiformes	Ciconiidae	R	CV	Wader
Yellow wattled lapwing	*Vanellus malabaricus* (Boddaert, 1783)	Charadriiformes	Charadriidae	R/LM	IN	Wader
Oriental White ibis	*Threskiornis melanocephalus* (Lantham 1790)	Ciconiiformes	Threskiornithidae	LM	P	Wader
Whiskered tern	*Chlidonias hybridus* (Pallas, 1811)	Charadriiformes	Sternidae	M	CV	Aerial forager
Black crowned night heron	*Nycticorax nycticorax* (Linnaeus, 1758)	Pelecaniformes	Ardeidae	R	CV	Wader
Comb duck	*Sarkidiornis melanotos* (Pennant, 1769)	Anseriformes	Anatidae	WM	OM	Swimmer
Eurasian wigeon	*Anas penelope* (Linnaeus, 1758)	Anseriformes	Anatidae	WM	HE	Swimmer
Garganey	*Anas querquedula* (Linnaeus, 1758)	Anseriformes	Anatidae	M	HE	Swimmer
Cattle egret	*Bubulcus ibis* (Linnaeus, 1758)	Ciconiiformes	Ardeidae	LM	CV	Wader
Common sandpiper	*Actitis hypoleucos* (Linnaeus, 1758)	Charadriiformes	Scolopacidae	R/WM	CV/IN	Wader
Little ringed plover	*Charadrius dubis* (Scopoli, 1786)	Charadriiformes	Chardriidae	M	CV/IN	Wader

R – Resident; M – Migrant; RM – Resident Migrant; LC- Local Migrant; WM- Winter Migrant; CV – Carnivores; IN – Insectivores; OM – Omnivores; P – Piscivores

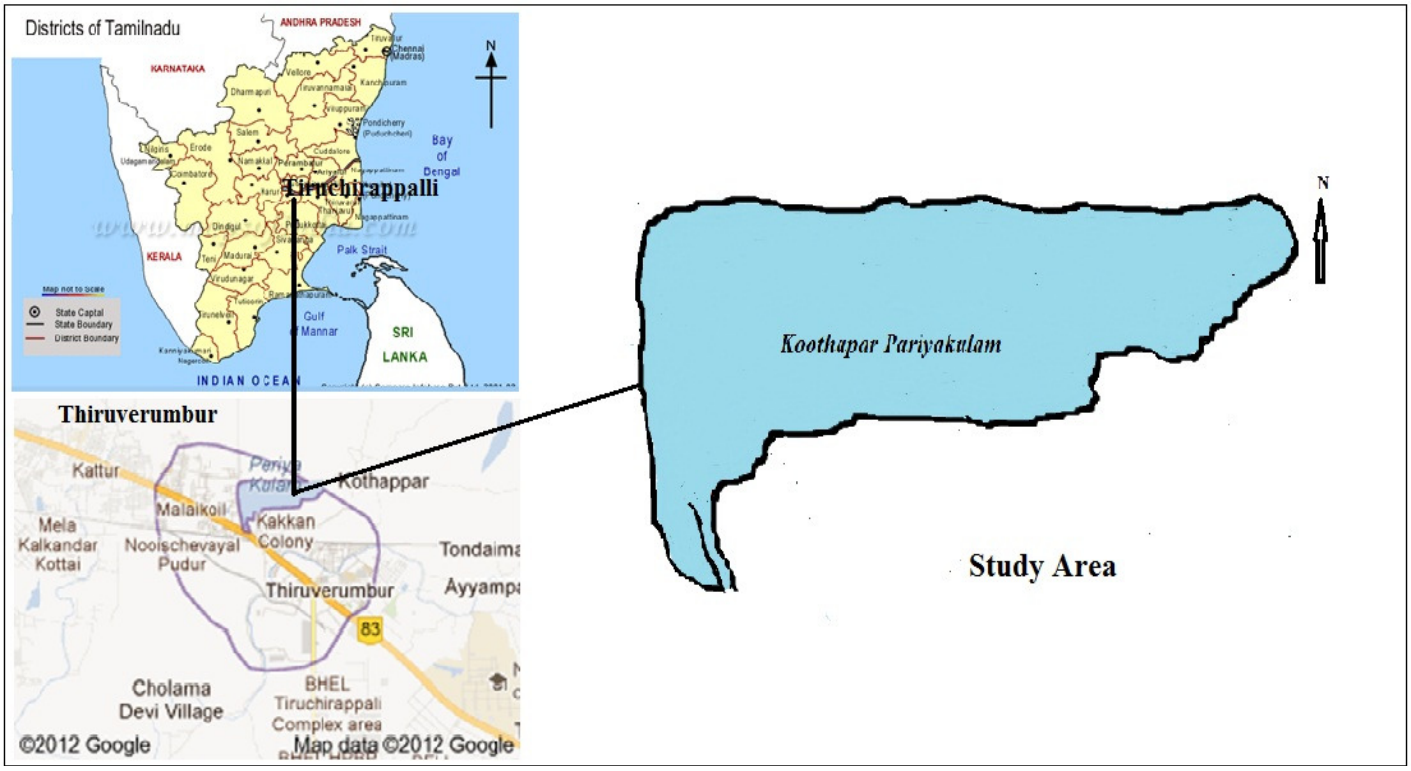

Figure-1
Koothapar Periyakulam Wetland

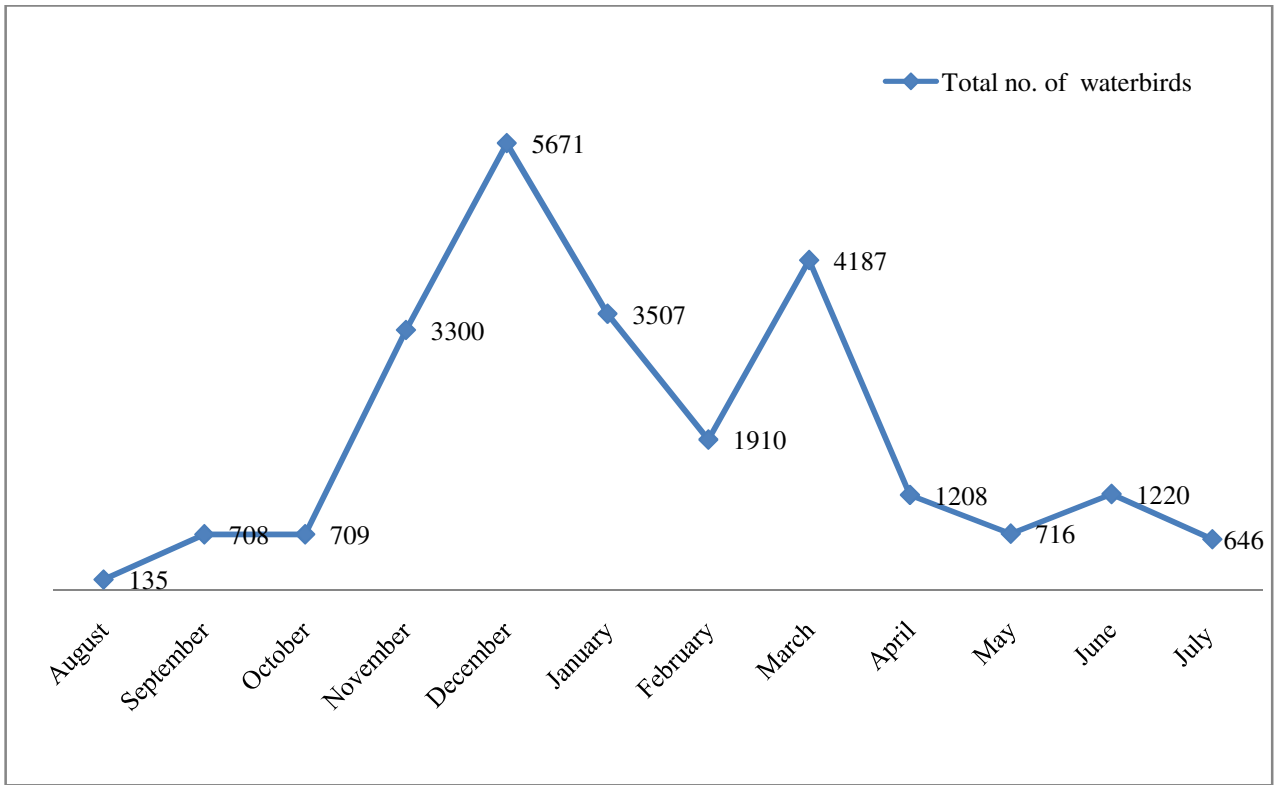

Figure-2
Total number of individual waterbirds in the wetland during 2013 - 2014

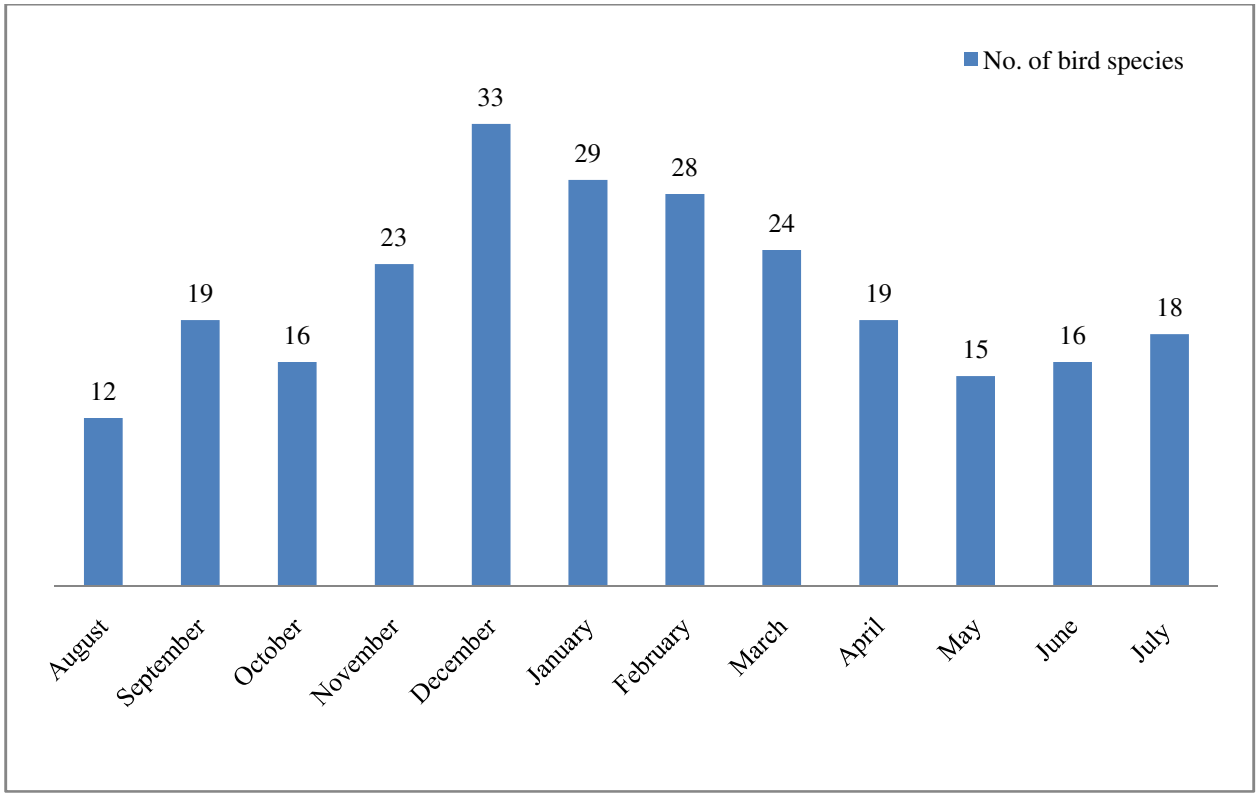

Figure-3
Total number of species in Koothapar wetland during 2013 - 2014

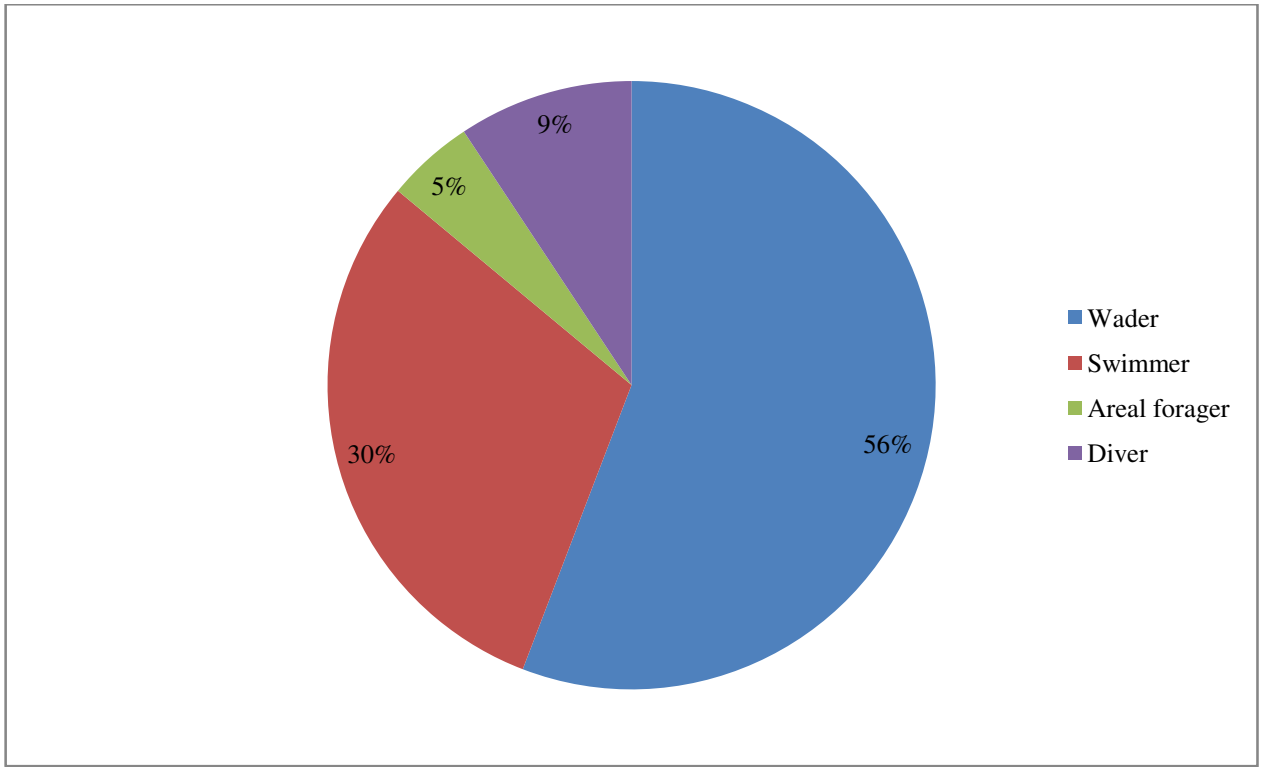

Figure-4
Percentage of various ecological groups of water birds during 2013 – 2014

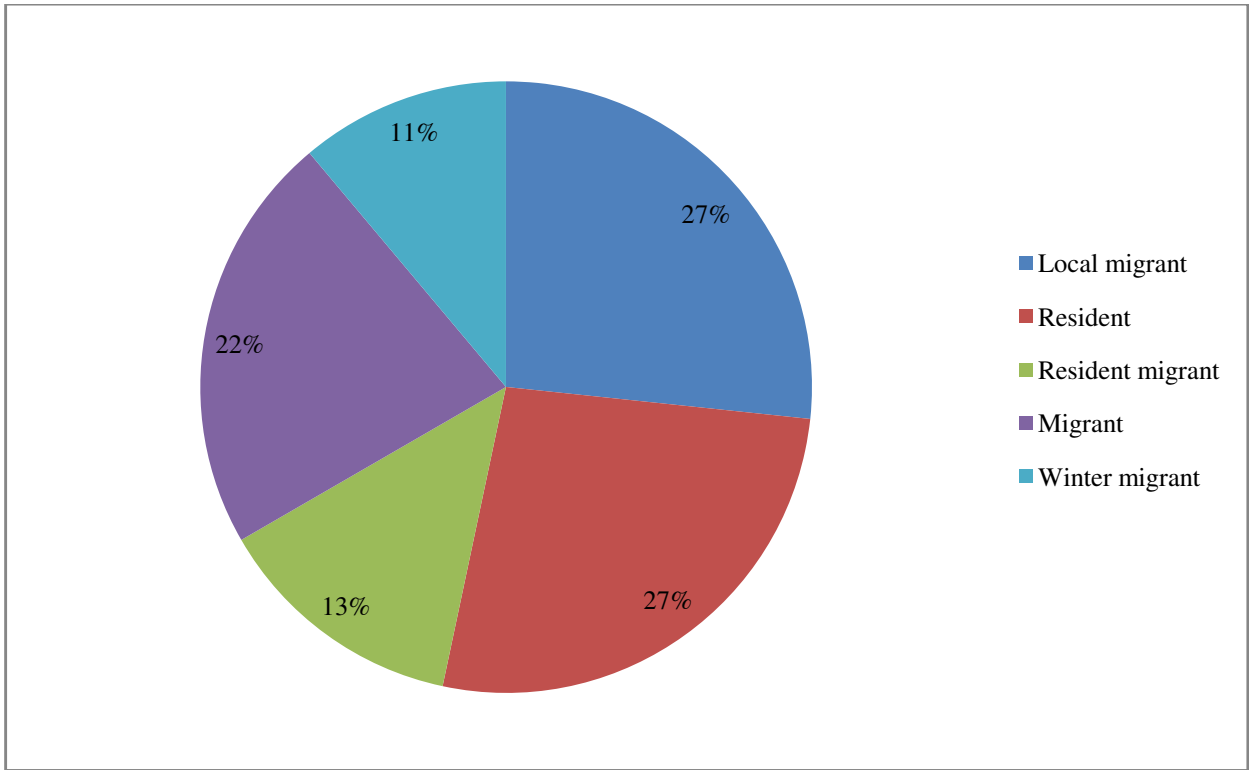

Figure-5
Percentage of various residential groups of waterbirds in Koothapar wetland during 2013 - 2014

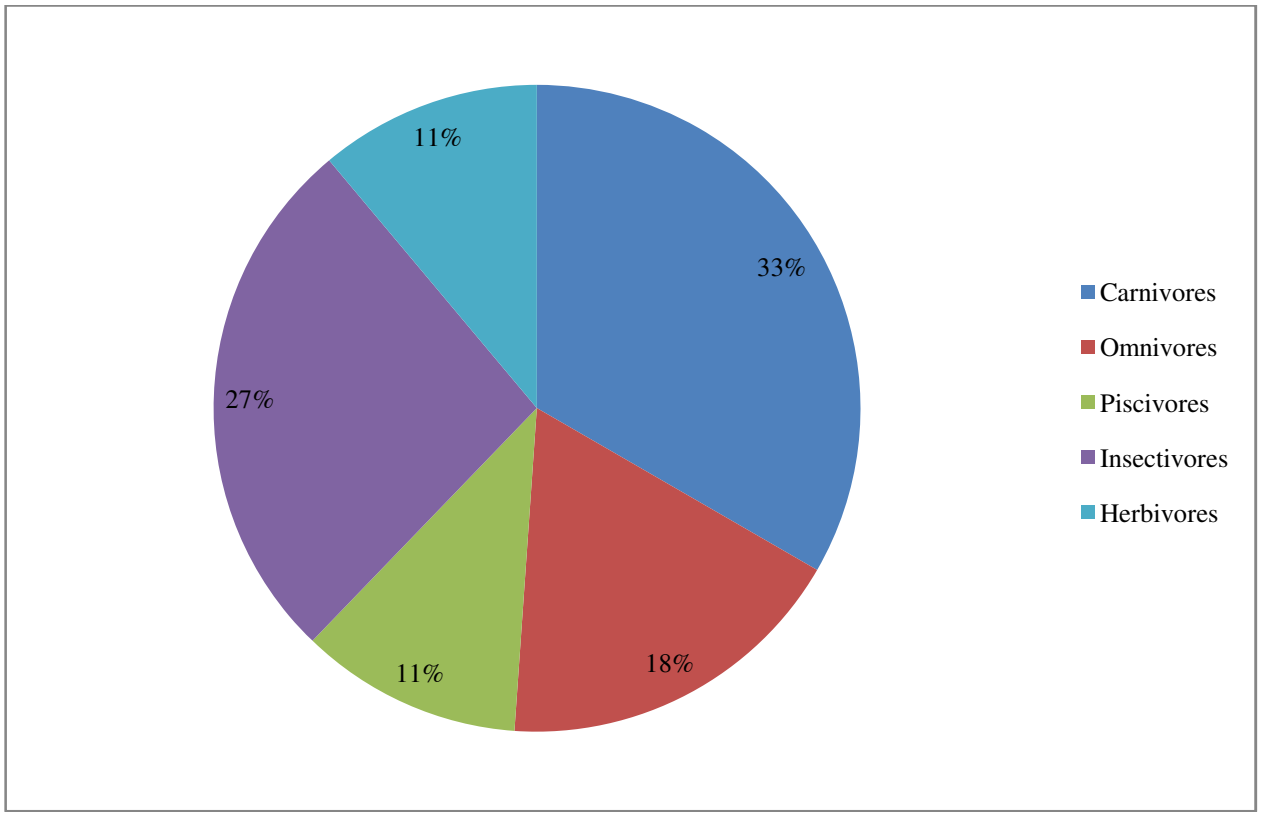

Figure-6
Percentage of various feeding groups of waterbirds in Koothapar wetland during 2013 – 2014

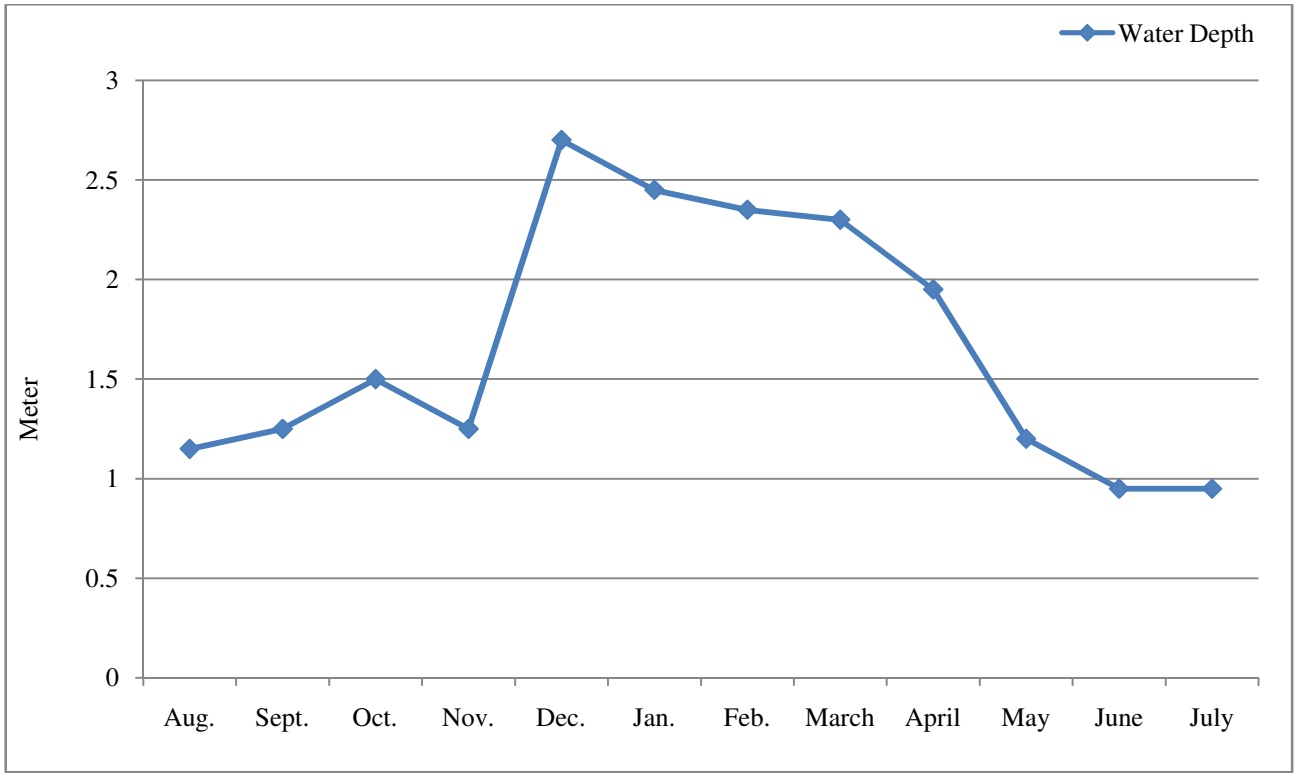

Figure-7
Average water depth of Koothapar wetland during 2013 – 2014

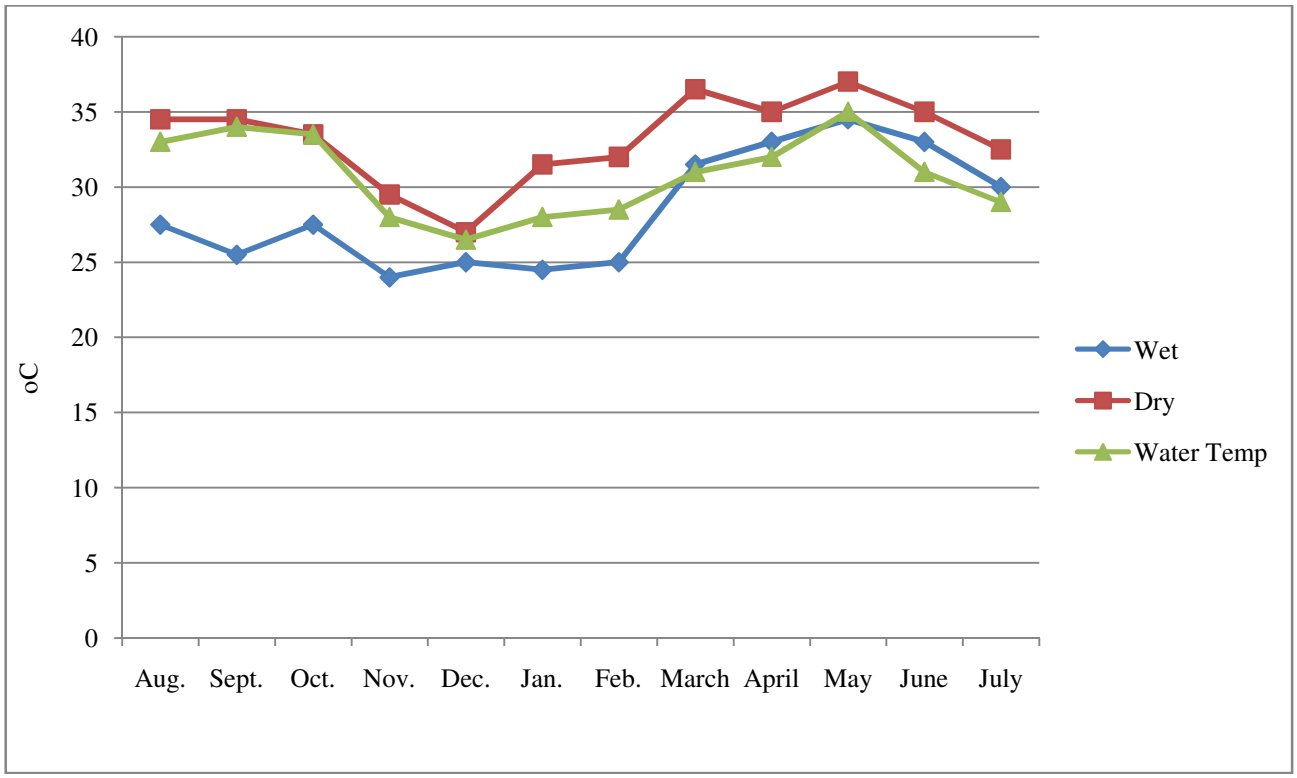

Figure-8
Variations of atmospheric and water temperature in Koothapar wetland during 2013-14

Koothapar wetland attracts many waterbirds includes migrants, local migrants, waterfowls, swimmers, divers, waders and several threatened and near threatened species. During the study, 43 species of waterbirds were observed in the wetland which belong to 7 orders and 14 families, which contain various ecological, residential and feeding groups. Maximum bird species was recorded in the wetland belonging to Order Peliconiformes, Charadriiformes, Anseriform and Gruiformes and of the families Ardeidae, Anatidae Rallidae, Scolopacidae and Threskiornithidae.

The waterbird abundance and species richness of the wetland fluctuated during different months and the seasons. In December the maximum of 5671 individual number of waterbirds belonging to 33 species were recorded in the wetland. During the same month the maximum water level and minimum temperature (water and atmosphere) were also recorded. This was due to heavy rains and inflow of the channel water during Northeast Monsoon (November and December). The water level of the wetland increased towards the winter and decreased towards the summer. This could be the possible reason for attracting high number of waterbirds especially of migratory birds and waterfowl during December. Various studies reported that water level and the bird abundance are inter-related[19].

Migratory waterbirds are the remarkable components of the wetland. The presence of a large number of migratory birds in a particular wetland makes charismatic[20]. These birds connect continents and countries. Therefore it is considered as an excellent environmental indicator at both global and local scales[21]. Next to the waders and the swimmers, 22% of migratory birds were present in the wetland. They included: Eurosian spoon bill (*Platalea leucorodia*), Common teal (*Anas crecca*), Marsh sandpiper (*Tringa stagnatilis*), Common green shank (*Tringa nebularia*), White bellied heron (*Ardea insignis*), Northern pintail duck (*Anas acuta*), Spot billed pelican (*Pelecanus philippensis*), Whiskered tern (*Chlidonias hybridus*). Eleven percent of the birds were winter migrants such as Norther shoveller (*Anas clypeata*), Common sand piper (*Actitis hypoleucos*), Comb duck (*Sarkidiornis melanotos*), Eurosian wigeon (*Anas penelope*) and Common moorhen (*Gallinula chloropus*).The selection pattern of the wetland by migratory birds is based on their feeding and breeding demands for maintaining their physiological requirements[22]. They feed on rich protenesious food in winter[4]. About 56% of waders and 30% of swimmers were dominating the wetland. Carnivore and insectivore guild were the major feeding guilds in the study area.

Water fowls are another important waterbirds found in the wetland which often concentrates where the natural foods are abundant[23]. Their migratory behavior and seasonal distributions are facing great challenge due to changes in climate and water quality and quantity[24]. Eight species of waterfowls such as Spott-billed pelican *Pelecanus philippensis*, Commen teal *Anas crecca*, Spott-billed duck *Anas poecilorhyncha*, Northern pintail duck *Anas acuta*, Lesser whistling duck *Dendrocygna javanica*, Northern shoveller *Anas clypeata*, Comb duck *Sarkidiornis melanotos*, Garganey *Anas querquedula*, Eurasian wigeon *Anas penelope* were observed in the wetland. Waterfowls are known as Swans, Geese, and Ducks belonging to the family Anatidae, of which Teals are smallest one[25]. Large number of duck populations can act as a barometer of the wetlands which indicate the health of the surrounding environment[24].

More than 60 individuals of Spot-billed Pelican *Pelecanus philippensis* a "Globally threatened" species were recorded during April to July in the wetland. "Near threatened" Darter *Anhinga rufa,* Oriental white ibis *Threskiornis melanocephalus* Painted stork *Mycteria leucocephala*, Glossy Ibis *Plegadis falcinellus*, Eurasian Spoonbill *Platalea leucorodia* and Little Egret *Egretta garzetta* breed in this wetland. These are the remarkable species of the wetland. Heronry species namely Grey Heron *Ardea cinerea*, Purple Heron *Ardea purpurea*, cormorants *Phalacrocorax* spp., Cattle Egret *Bubulcus ibis*, Little Egret *Egretta garzetta* and Large or Great Egret *Casmerodius albus* were recorded.

Vegetation cover was also recorded in the wetland. *Eichornia crassipes,* the most spreaded and dominant weed plant was found in the wetland. It acts as sheltering and foraging area for the waterbirds such as Jacanas and Moorhens[25]. The *Acacia nilotica* trees are the major nesting places for the waterbirds. Other trees namely Neem tree *Azadirachta indica*, Portia tree *Thespesia populnea*, Banyan tree *Ficus benghalensis*, Peepal tree *Ficus religiosa*, Asian palmyra palm *Borassus flabellifer*, Golden Shower *Cassia fistula*, Red date *Zizyphus jujuba*, Indian Ash *Lannea coromandelica* were identified around the wetland.

Thus this wetland is an important habitat for many migratory and several threatened and near threatened waterbirds. Besides hunting, solid waste dumping near the wetland, open defecation, sewage discharges were some of the human activities found in the wetland. It is recommended to plant high number of acacia tree that would attract high diversity of waterbirds in the wetland.

Conclusion

Koothapar Periyakulam wetland acts as a feeding and breeding ground for many waterbirds such as migratory birds, waterfowl, wader, swimmer, diver and threatened bird species. Globally threatened Spot billed pelican was one of the remarkable species found in the wetland. Many bird species like Little grebe, Northern pintail duck, Spot billed duck, Common teal, whistling duck, Herons, Egrets, Cormorants, Jacanas, Terns, Lapwings, Common coot, White breasted water hen, Purple moorhen, Painted stork, Comb duck, Eurosian wigieon, Garganey, and Eurosian spoon bill were found to be dominating and bulk of the waterbirds sighted at this wetland. Hence Koothapar periyakulam wetland is ecologically very important for several taxa of water birds especially migratory birds, waterfowls and threatened species. It is recommended that necessary action be undertaken to conserve this important

wetland: Planting large number of *Acacia nilotica* species. Prohibition of Hunting in the wetland. Banning of solid waste dumping near the wetland. Creating awareness to the local people regarding the importance of the wetland and waterbirds.

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