

Status of Major Wetlands and Wetland Birds in Kanyakumari, Coimbatore, Thanjavur, Thiruvavur, Perambalur, Cuddalore, Nagapattinam and Trichy Districts in Tamilnadu, India

¹M. Bubesh Guptha, ²N. Sridharan, ³Lalitha Vijayan, ⁴K. Thiyagesan,
⁴S. Sandaliyan and ³S. Somasundaram

¹Wildlife Management Division, Sullurpet Andhra Pradesh, 524121, India

²Wildlife Institute of India, Dehradun, 248 001, India

³Salim Ali Center for Ornithology and Natural History, Anaikatty, Coimbatore, India

⁴Department of Zoology, A.V.C College (Autonomous), Mayiladuthurai, India

Abstract: The present study was carried out to assess the status of the wetland birds in selected wetlands of Kanyakumari district (15 wetlands), Thanjavur district (24 wetlands), Cuddalore district (2 wetlands), Nagapattinam district (1 wetland), Coimbatore district (10 wetlands), Trichy district (7 wetlands), Perambalur district (8 wetlands) and Thiruvavur district (2 wetlands) were surveyed in Tamilnadu, during January to March 2006. To evaluate the quality of wetlands in these districts based on the total number and species of wetland birds. During the study period 69 wetlands were surveyed in eight districts and 29,824 birds were recorded belonging to 85 species 33 families out of which 53 species were fully dependent on wetlands and 32 species are terrestrial bird. The maximum number of birds recorded was in Karavetti lake (8091), followed by Wellington Lake (2783), Vaduvor Lake (1457), Theroor lake (1184), Uthayamarthandapuram (1086) and Thirumeni lake (906). The maximum species was also in Karaivetti Lake (31) followed by Wellington Lake (27), Theroor Lake (25) and Uthayamarthandapuram (22). Little Cormorant *Phalacrocorax niger* (2428) was the most abundant species followed by Cattle Egret *Bubulcus ibis* (2393), Garganey Teal *Anas querquedula* (2335), Little Egret *Egretta garzetta* (1656), Common Teal *Anas crecca* (1200) and Garganey Teal *Anas querquedula* (1177) recorded in the entire wet lands surveyed. The migratory status of bird species showed that 79.92 % were resident and 20.08 % migrant birds. Bird species diversity was calculated by using Shannon Weaver's index (1963) and the maximum diversity was observed in Periyakulam (2.70) followed by Putheri (2.66), Kallakurchi lake II (2.5), Arampundan eri (2.47), Asur lake (2.39) and Sular (2.35). The species diversity was least in Kada eri (0.41) Maximum number of species and individuals were recorded in Karaivetti bird sanctuary in Perambalur district and minimum was recorded in Perumthottam wetland in Nagapattinam district.

Key words:Wetland • Water birds • Abundance • Diversity • Tamil Nadu • Recommendation and Conservation

INTRODUCTION

Wetlands are one among the most important and productive ecosystems of the world, occupying about 6% of the earth's surface [1] and were described as "kidney of the landscape" as they function as the downstream receivers of water and waste from both natural and human resources [2]. Wetlands are important bird habitats and they used for their livelihoods. Wetlands have been drained, modified,

or created to produce or enhance agricultural crops and also treated as waste disposal areas around the world. This degradation has had an incalculable effect on wildlife numbers, water quality, hydrological cycles and other wetland functions and values. Wetlands are the important bird habitats and they use them for feeding, roosting and breeding [3, 4]. Natural wetlands are in decline throughout the world as the human population keeps growing. Wetlands that have been drained, modified, or created to produce or enhance agricultural crops.

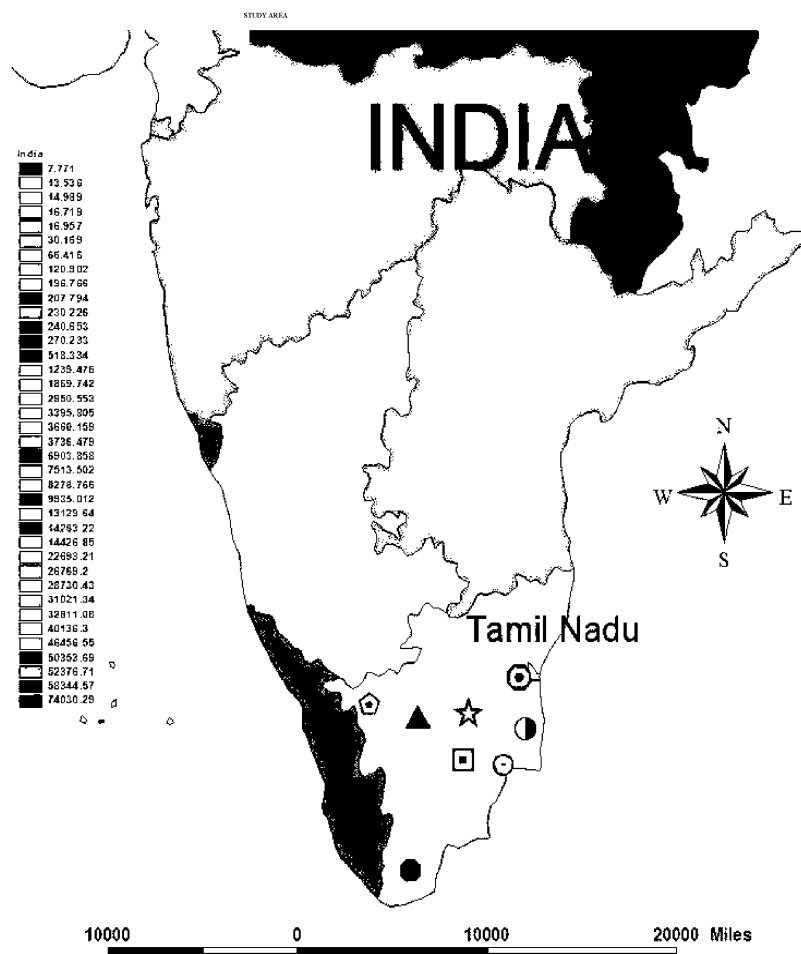


Image 1: Map indicating the locations of the study districts in Tamil Nadu, India

This degradation has had an incalculable effect on wildlife numbers, water quality, hydrological cycles and other wetland functions and values. A recent study has shown about 38% loss of inland wetland in India during 1971 to 2001 [5].

Wading birds, especially the colonial nesting waders are one of the most conspicuous and well-known components of the wetland ecosystems [6, 7]. Wetland birds are excellent indicators of water quality and measures of biodiversity. The wetland birds were used as an indicator of wetland function or as measures of success in wetland management, restoration and creation [3]. Hence, this study was undertaken to assess their status in the selected wetlands and to evaluate the quality of wetlands based on the status of the birds [8].

Study Area: Tamil Nadu endowed with beautiful nature, has a tradition of preserving the ponds and tanks. The state has a number of rivers, all flowing from west to east from the Western Ghats to the Bay of Bengal. The rivers are entirely rain fed, short in length and are relatively small and seasonal. The presence of a large number of man-made wetlands (Village irrigation tanks) is a characteristic feature of the lowland plains. Totally, 69 major wetlands were surveyed in eight selected districts (Image 1). Thanjavur District lies as the East Coast of Tamil Nadu, between 09°50' N to 11°25' N and 78°45' to 79°25' E. In this district 24 wetlands were surveyed namely Vaduvor lake, Kallaperambur lake, Arampundan lake, Ellachi lake or Maruthuri lake, Uppankuzhi lake andal lake, Aramundan lake, Kotra lake, Sembian lake, Kumman lake, Sayakudi lake, Alakapat lake,

Pagadakudy lake, Pathamathiran lake, Maruthakudy lake, Pidari lake, Nangi lake, Raja lake, Vadavali lake, Bala lake, Ela lake, Karamba lake, Kada lake and Valambakudy lake. Kanyakumari is the southernmost district of Tamil Nadu, which lies between 08°03'N to 08°35'N and 77°15' E to 77°36' E. In Kanyakumari district, 15 wetlands were selected namely Suchindram pond, Parakkai pond, Theroor pond, Manikkaputheri, Thathiar, Suchindram pond, Thalakudi pond, Putheri, Periakulam, Veeranikulam, Chunkakadai and Vembanur. Cuddalore district lies on the East Coast, to the north of Nagapattinam district, between 11°12' N to 12°35' N and 78°38'E to 78°80' E. In this district, two wetlands namely Wellington and Veeranam Lake were selected. Nagapattinam district lies between 10°25' N to 11°40' N and 76° 49' E to 80°01' E. Perumthottam wetland was selected for the Nagapattinam district. Thiruvavur district, between 10°20' N to 10° 07' E and 79° 15' E to 79° 45' E. In this district, two wetlands were selected namely Uthayamarthandapuram and Thirumeni lake. Perambalur district, between 10°58' N to 10°88' N and 79°02' E to 79°07' E. In this district, eight wetlands were selected namely Karaivetti lake, Kalinga lake, Kallankuruchi lake-I, Kallankuruchi lake-II, Ayyan lake, Srinivasapuram lake, Chetti lake, Thamaraikulam lake. Coimbatore district, between 10° 59' N to 10° 57' N and 76° 57' E to 76° 58' E. In this district, ten wetlands were selected namely Ukkadam lake, Kuruchi lake, Valankulam, Sular lake-I, Sular lake-II, Singanallur lake-I, Singanallur lake-II, Ramachandrapuram, Uppuchiputhur and Vettaikaran puthur. Trichy district, between 10° 20' N to 10° 07' N and 79° 15' E to 79° 45' E. In this district, seven wetlands were selected namely Asur lake, Thaneerpatti lake-I, Thaneerpatti lake-II, Planganangudi lake, Nilamuthy lake, Thuvakudi lake and Valavanthankottai.

MATERIALS AND METHODS

This study was carried out from January to March 2006. Birds are being counted following wide variety of methods. For water birds, direct counting method was used. In this method, a suitable vantage point is selected and all visible birds are counted. Another method, "total count" was used wherever possible, by walking around the wetlands or from specific vantage points to count the birds [9]. If not completely covered, the percentage of coverage was marked. (b) Block count: During counts, each site was divided into many sections and each section was counted. Birds flying from behind the

observer were not counted. Systematically this survey was conducted in early morning around 6.00 hrs to 10.00 hrs, all the birds on the ground or in the water were counted using Bushnell binocular (8x42) and identified [10, 11]. Vegetation cover also recorded in the study districts for analyzing quality of wetlands. We were used circular plot method for vegetation sampling, four to five plots were laid randomly in each wetland depending upon its size. Plot size was about one meter radius and vegetation cover was calculated in percentage. Shannon-Weiner diversity index was used for diversity estimation at different wetlands and commonness index and dominance index were used for estimating common and dominant bird species in different wetlands in the study area.

RESULTS

Distribution of Wetland Birds: During the study period 69 wetlands were surveyed in eight districts and 29,824 birds were recorded belonging to 85 species 33 families (Fig. 1). There was 53 species are fully dependent on wetlands and 32 species are terrestrial bird. Maximum number of species and individuals were recorded in Karaivetti bird sanctuary from Perambalur district and minimum was recorded in Nagapattinam district. Ardeidae contributed the maximum species of seven in all the districts followed by Anatidae and Scolopaciidae contributed five each. The maximum number of birds recorded was in Karaivetti lake (8091), followed by Wellington Lake (2783), Vaduvor Lake (1457), Theroor lake (1184), Uthayamarthandapuram (1086) and Thirumeni lake (906). The maximum species was also in Karaivetti Lake (31) followed by Wellington Lake (27), Theroor Lake (25) and Uthayamarthandapuram (22). Little Cormorant *Phalacrocorax niger* (2428) was the most abundant species followed by Cattle Egret *Bubulcus ibis* (2393), Garganey Teal *Anas querquedula* (2335), Little Egret *Egretta garzetta* (1656), Common Teal *Anas crecca* (1200) and Garganey Teal *Anas querquedula* (1177) recorded in the entire wet lands surveyed (Fig. 2). The migratory status of bird species showed that 79.92 % were resident and 20.08 % migrant birds. Trichy, Perambalur, Thanjavur and Kanyakumari districts had maximum migratory birds whereas in Thiruvavur and Nagapattinam only four species and one species were recorded respectively. During the study period one globally threatened and two near threatened species were recorded;

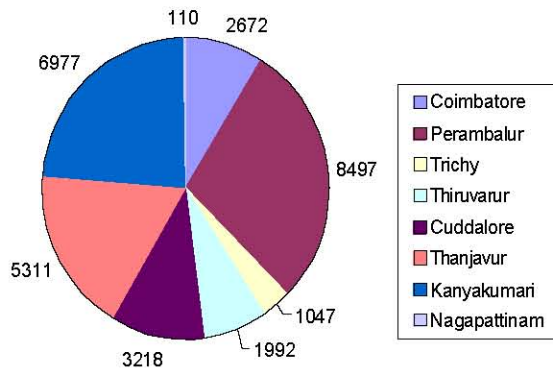


Fig. 1: Total Number of Birds Observed in Eight districts of Tamil Nadu

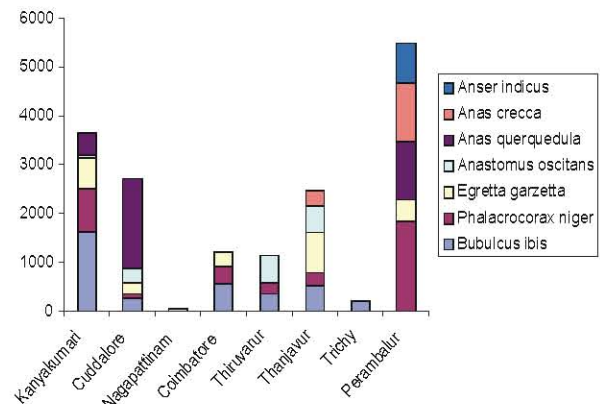


Fig. 2: Abundant Species Observed in the study areas

Appendix 1: Total Bird species and diversity in wetland wise

S. No	Name of the wetlands	Name of the Districts	No of species	No of birds	Species Diversity
1	Suchindram I pond	Kanyakumari	27	784	1.85
2	Parakkai I&II pond	Kanyakumari	20	134	2.37
3	Parakkai III pond	Kanyakumari	22	736	2.29
4	Theroor I pond	Kanyakumari	25	1184	2.07
5	Manikkaputheri	Kanyakumari	18	151	2.42
6	Thathiar	Kanyakumari	22	678	1.97
7	Theroor II pond	Kanyakumari	28	644	2.40
8	Suchindram II pond	Kanyakumari	19	298	2.21
9	Thazhakudi I pond	Kanyakumari	15	424	1.59
10	Thazhakudi II pond	Kanyakumari	27	351	2.34
11	Putheri	Kanyakumari	35	484	2.66
12	Periakulam	Kanyakumari	27	347	2.70
13	Veeranikulam	Kanyakumari	19	323	2.31
14	Chunkakadai	Kanyakumari	20	276	2.03
15	Vembanur	Kanyakumari	15	163	2.37
16	Vaduvoor Lake	Thanjavur	24	1457	2.04
17	Kalleperambur	Thanjavur	30	992	2.40
18	Arapundan	Thanjavur	17	246	2.47
19	Maruthuri eri or Ellachi eri	Thanjavur	3	21	0.94
20	Uppankuzhi eri	Thanjavur	12	80	1.78
21	Andal eri	Thanjavur	11	98	2.08
22	Aramundan eri	Thanjavur	5	15	1.43
23	Kotra eri	Thanjavur	16	179	1.85
24	Sembian eri	Thanjavur	5	38	1.25
25	Kumman eri	Thanjavur	14	77	2.04
26	Sayakudi eri	Thanjavur	11	423	1.08
27	Alakapat eri	Thanjavur	6	26	1.58
28	Pagadakudy eri	Thanjavur	3	34	0.96
29	Pathamathiran eri	Thanjavur	9	71	1.44
30	Maruthakudy eri	Thanjavur	16	309	2.34
31	Pidari eri	Thanjavur	16	202	2.35
32	Nangi eri	Thanjavur	23	446	2.24
33	Raja eri	Thanjavur	9	77	1.89

Appendix 1: Continued

S. No	Name of the wetlands	Name of the Districts	No of species	No of birds	Species Diversity
34	Vadavali eri	Thanjavur	13	107	2.05
35	Bala eri	Thanjavur	7	36	1.68
36	Ela eri	Thanjavur	9	116	1.86
37	Karamba eri	Thanjavur	8	145	1.42
38	Kada eri	Thanjavur	2	14	0.41
39	Valambakudi eri	Thanjavur	11	102	2.09
40	Veeranam Lake	Cuddalore	17	435	1.85
41	Wellington Lake	Cuddalore	27	2783	1.45
42	Perunthottam Lake	Nagapattinam	9	110	1.64
43	Ukkadam lake	Coimbatore	27	461	2.17
44	Kuruchi lake	Coimbatore	16	423	1.70
45	Valankulam	Coimbatore	12	56	2.08
46	Sulur lake-I	Coimbatore	19	169	2.30
47	Sulur lake-II	Coimbatore	14	164	2.35
48	Singanallur lake-I	Coimbatore	15	293	1.90
49	Singanallur lake-II	Coimbatore	8	73	1.48
50	Ramachandrapuram	Coimbatore	12	59	2.01
51	Uppuchiputhur	Coimbatore	8	46	1.92
52	Vettaikaran puthur	Coimbatore	28	928	2.35
53	Asur lake	Trichy	20	355	2.39
54	Thaneerpatti lake-I	Trichy	17	84	2.28
55	Thaneerpatti lake II	Trichy	18	202	1.96
56	Planganangudi lake	Trichy	9	56	1.74
57	Nilamuthy lake	Trichy	8	50	1.38
58	Thuvakudi lake	Trichy	10	78	1.31
59	Valavanthankottai	Trichy	16	222	1.65
60	Karaivetti lake	Perambalur	31	8091	1.63
61	Kalinga lake	Perambalur	12	59	1.98
62	Kallankuruchi lake-I	Perambalur	9	79	1.59
63	Kallankuruchi lake-II	Perambalur	11	100	2.50
64	Ayyan lake	Perambalur	9	94	2.25
65	Srinivasapuram lake	Perambalur	5	14	1.85
66	Chetti lake	Perambalur	4	58	1.59
67	Thamaraikulam	Perambalur	1	2	0.00
68	Uthayamarthandapuram lake	Tiruvarur	22	1086	1.47
69	Thirumeni lake	Tiruvarur	21	906	1.40



Open Billed - Stork *Anastomus oscitans* in our Study Area



Wetland in our Study Area

namely Spotbilled Pelican *Pelecanus philippensis*, Darter *Anhinga melanogaster* and Painted Stork *Mycteria leucocephala*. In all the wetlands considerable vegetation cover was observed. Bird species diversity was calculated by using Shannon Weaver's index (1963) and the maximum diversity was observed in Periyakulam (2.70) followed by Putheri (2.66), Kallakurchi lake II (2.5), Arampundan eri (2.47), Asur lake (2.39) and Sulur (2.35). The species diversity was least in Kada eri (0.41) (Appendix 1).

DISCUSSION

In Indian wetlands 318 species of birds were recorded out of which 193 species are fully dependent on wetlands [12]. Twenty eight of the 31 species of colonially nesting large water birds that are known to breed in Indian heronries, namely Spot-billed Pelican *Pelecanus philippensis*, Little Cormorant *Phalacrocorax niger*, Indian Shag *Phalacrocorax fuscicollis*, Great Cormorant *Phalacrocorax carbo*, Darter *Anhinga rufa*, Little Egret *Bubulcus ibis*, Grey Heron *Ardea cinerea*, Large Egret *Egretta alba*, Median Egret *Egretta intermedia*, Cattle Egret *Bubulcus ibis*, Indian Pond-Heron *Ardeola grayii*, Black-crowned Night-Heron *Nycticorax nycticorax*, Painted Stork *Mycteria leucocephala*, Asian Openbill-Stork *Anastomus oscitans*, White Ibis *Threskiornis melanocephalus*, Black Ibis *Pseudibis papillosa*, Glossy Ibis *Plegadis falcinellus*, Eurasian Spoonbill *Platalea leucorodia* nest in Tamil Nadu [13]. These were Karavetti, Thirumeni, Sulur and Vettaikaranputhur. Towards the end of winter, February - March, most of the migratory birds started moving and also the water level started decreasing

in the wetlands, which are possible reasons for the less sighting frequency. Various studies reported that water level and the bird abundance are inter-related one [14]. In the study area only 21 % of birds were migratory and the remaining ones are local migrant or resident, whereas in Bharathpur bird sanctuary it was 60 % [9]. The *Tringa hypoleucos* and *Tringa glareola* were recorded in most of the wetland sites. *Tringa hypoleucos* mostly preferred the edges of the wetlands for feeding. *Bubulcus ibis*, *Egretta garzetta*, *Phalacrocorax niger* and *Anas querquedula* are the some of the common species in the study site. This species are the resident and the food abundance of this species was high in most of the sites. It was found that rice fields and other agricultural habitats were used more by Cattle Egrets than other habitats [15]. During the study period three globally near threatened species are recorded; namely Spot-billed Pelican *Pelecanus philippensis*, Darter *Anhinga rufa* and Painted Stork *Mycteria leucocephala* [12]. Totally 87 Pelicans were observed out of which 37 birds were at Ukkadam in Coimbatore district. Any areas that possess 1% of its world population in a regular manner can be declared as an Important Bird area [16]. *Anhinga rufa* was recorded except in Trichy district and maximum of 18 birds were recorded in Vattaikaranputhur. Depends and more open water is require for the *Anhinga rufa* for fishing. When wetlands are covered with weeds such as *Ipomea* and *Eichhornia*, these species and many others are unable to use the site. This population is important and the areas must be protected and monitored. Similar type of result was observed at KTDC Complex at Kerala [17]. Natural wetlands continue to decrease in area and throughout world [18]. Ardeidae contributed the maximum family as in

many other studies [9, 17, 19]. In the earlier study 318 species were reported in the inland wetlands of Tamil Nadu out of which, 193 species fully depend on wetlands [20]. Whereas in our study only 85 species were recorded, out of which 53 species were fully dependent on wetlands. This lower record of species number might be due to the reason that the present study viz., January to March 2006 was a period of post winter season, at which time the water availability is very low and also the study was restricted to only few districts of Tamil Nadu. During the present study period the water level started decreasing in many of the wetlands and most of the migratory birds started moving. This might be the reason for the less sighting frequency. Various earlier studies have also reported that water level and bird abundance are inter-related ones [9,14]. Nineteen of the colonially nesting waterbirds are known to breed in Indian heronries [13]. During the present study eight species of herons were found to breed in different wetland sites. During the study period, one Threatened species namely Spot-billed Pelican and two Near Threatened species viz., Darter *Anhinga melanogaster* and Painted Stork *Mycteria leucocephala* were recorded [21]. Shortage of nest sites was observed in many wetlands, mainly due to cutting, lopping of trees for timber, fuel-wood and fodder. *Nelumbo nucifera* was used by marsh nesting birds. In the present study, the maximum number of birds was recorded in moderate vegetation cover and most of the wetlands had a high vegetation cover. It might be affect feeding habits of birds and the nature of the wetlands. According to the results, vegetation cover might be factor to determine birds' population and diversity and the same trend was observed in Keoladeo National Park [22]. It is interesting to note those lily pond ecosystems are invariably used by all the birds in the study sites. The wetland birds do not feed in those ponds but gather at the pond to seek relief from heat stress. *Ipomea carnea* was affecting especially, fully dependent wetland birds. Many wetlands such as Suchindram, Theroor, Vaduvor and Kalleperambur have supported good number of birds and these wetlands are protected areas, Vaduvor has recently been declared as bird sanctuary. The major threats observed in the study wetlands were drainage, conversion for cultivation, encroached for roads, settlements and human disturbances especially fishing. The above mentioned threats were also reported elsewhere [23-25]. Some nesting sites are close to human settlements and at the time of sunset, the colonial nesting birds make huge noise, often leading to conflict with local people. Loss of wetlands has significantly increased the importance of wetland-dependent organisms such as

waterbirds (e.g. Podicipediformes, Ciconiiformes, Anseriformes, Gruiformes and Charadriiformes) [2]. For management of wetlands, this importance has led to attracting diverse and abundant waterbird communities by providing a diversity of foraging habitats [26-29]. These wetlands play an important role in the breeding and roosting for birds and also several other taxa of fauna and flora. We recommend further surveys and intensive studies in various seasons of the year, which bring out better results for the conservation of these wetlands.

RECOMMENDATION AND CONSERVATION

During this study in the eight districts 69 wetlands were covered. Analysis of the data showed that three wetlands in Coimbatore Singanallur, Suler Vettikaranputhur, in Kanyakumari district in Theroor wetland, Vaduvor Lake and Kallaperambur in Thanjavur district, Thirumeni in Tiruvarur district had a good population of birds. In karavetti bird sanctuary, Vaduvor bird sanctuary and Udhayamarthandapuram was also supporting more birds were recorded and it is protected also. Successful conservation of the species will depend on an improved understanding of its ecological requirements and moving patterns.

As a wetland ecosystem this area is important for the breeding and roosting birds and several other taxa of fauna and flora. This region is the biggest and the premier roosting and nesting grounds for many wetland wading birds including globally near threatened bird - *Anhinga melanogaster*. The study area has a good area of reeds also and it has crucial part in the breeding of the *Ardea purpurea*, *Mesophoyx intermedia* and *Nycticorax nycticorax*. Successful conservation of the species will depend on an improved understanding of its ecological requirements and moving patterns. Further surveys and intensive studies in different seasons of the year will bring out better results for the conservation of these wetlands [30].

ACKNOWLEDGEMENTS

We thank V.S. Vijayan, Founder, Sálím Ali Centre for Ornithology and Natural History, Coimbatore for encouragement. This study was conducted as a part of the project "Wetland birds status survey in Tamil Nadu" funded by the Ministry of Environment and Forest, Government of India. We are grateful to the Chief Wildlife Warden, Tamil Nadu Forest Department and the DFO of the Kanyakumari, Cuddalore, Nagapattinam, Thanjavur, Coimbatore, Trichy, Perambalur and Tiruvarur

districts. The first author is thankful to the Principal, A.V.C. College, Mayiladudurai for the encouragement to carry out this study. The first author is also thankful to Gopi.G.V (WII) for his help to make this article.

REFERENCES

- Maltby, E. and R.E. Turner, 1983. Wetlands of the world. *Geographical Magazine*, 5: 12-17.
- Mitsch, W.J. and J.G. Gosselink, 2000. Wetlands, 3rd edn. Elsevier Science, New York, NY. 920p.
- Owens, N.W. 1977. Responses of wintering Brent Geese to human disturbance. *Wildfowl*, 28: 5-14.
- Weller, M.W., 1999. Wetland birds habitat resources and conservation implications. Press Syndicate of the University of Cambridge, United Kingdom, pp: 316.
- Stewart, R.E., 2001. Technical aspects of wetlands. Wetlands as bird habitat. National water summary on wetland resources, United States Geological Survey.
- Prasad, S.N., A.K. Jaggi, P. Kaushik, Lalitha Vijayan, S. Muralidharan and V.S. Vijayan, 2004. Inland wetlands of India. Conservation Atlas. Salim Ali Centre for Ornithology and Natural History. Coimbatore, India, pp: 222.
- Hancock, J., 1984. The birds of the wetlands. Croom Helm, London, pp: 176.
- Sharitz, R.R. and J. Gibbons (Eds.) 1989. Freshwater wetlands and wildlife. U.S. Department of Energy, Washington, D.C., pp: 124.
- Vijayan, L., S.N. Prasad, N. Sridharan and M.B. Guptha, 2006. Status of wetlands and wetland birds in Tamil Nadu. Research Report.
- Vijayan, V.S., 1991. Keoladeo National Park Ecology Study - Summary Report 1980-1990. Bombay Natural History Society, Mumbai, pp: 337.
- Grimmett, R., C. Inskipp and T. Inskipp, 1998. Birds of the Indian Subcontinent. Bombay Natural History Society, Oxford University Press, pp: 784.
- Ali, S., 2002. The book of Indian birds. Bombay Natural History Society, Oxford University Press, pp: 326.
- Vijayan, V.S., 1986. On conserving the bird-fauna of Indian wetlands In: Proceeding of Indian Academy of sciences (Suppl.): 91-101.
- Subramanya, S., 2005. Heronries of Tamilnadu. *Indian Birds*, 1: 126-131.
- Colwell, M.A. and O.W. Taft, 2000. Water bird communities in managed wetlands of varying water depth. *Water Birds*, 23: 1121-1133.
- Lombardini, K. R.E. Bennetts and C. Tourneg, 2001. Foraging success and foraging habitat used by Cattle Egrets and Little Egrets in Camargue, France. *Condor*, 103: 38-44.
- Rahmani, A., (Ed). 2002 Asian Waterbird census: Final Report, India. Bombay Natural History Society, Bombay.
- Narayana, S., 2004. Status and Ecology of the breeding wetland birds in the KTDC. Tourist complex, Kumarakom, Kerala.
- Czech, H.A. and K.C. Parsons, 2002. Agricultural wetlands and water birds: A Review. *Water Birds*, 25: 56-65.
- Urfi, A.J. and S.C. Sharma, 1992. Bird conservation at some lesser known Wetlands around Delhi. *Newsletter for Bird Watchers*, 32: 2-3.
- Vijayan, V.S., S. Narendra Prasad, Lalitha Vijayan and S. Muralidharan, 2004. Inland Wetlands of India Conservation Priorities. SACON, pp: 532.
- Birdlife International, 2001. Threatened birds of Asia: the Birdlife International Red Data Book. Cambridge, U.K., pp: 852.
- Vijayan, L., 1995. Management of wetland for the resident waterfowl. pp: 121-131 In: B.Gopal (Ed.). Handbook of wetland management. WWF-India, New Delhi.
- Kaiser, M.S. and E.K. Fritzell, 1984. Effects of river recreations on Green-backed Heron behavior. *Journal of Wildlife Management*, 48: 561-567.
- Burger, J. and M. Gochfeld, 1991. Human activity influence and diurnal and nocturnal foraging of Sander lings (*Calidris alba*). *Condor*, 93: 259-265.
- Skagen, S.K., R.L. Knight and G.H. Orians, 1991. Human disturbance of an avian scavenging guild. *Ecological Applications*, 1: 215-225.
- Fredrickson, L.H. and F.A. Reid, 1986. Wetland and riparian habitats: a nongame management overview. Management of Nongame Wildlife in the Midwest: A Developing Art (J.B. Hale, L.B. Best and R.L. Clawson, eds), pp: 59-96. The Wildlife Society, Grand Rapids, MI.
- Velasquez, C.R., 1992. Managing artificial salt pans as water-bird habitat: species' responses to water level manipulation. *Colonial Waterbirds*, 15: 43-55.
- Laubhan, M.K. and L.H. Fredrickson, 1993. Integrated wetland management: concepts and opportunities. Transactions of the North American Wildlife and Natural Resources Conference, 58: 323-334.
- Reid, F.A., 1993. Managing wetlands for waterbirds. Transactions of the North American Wildlife and Natural Resources Conference, 58: 345-350.
- Guptha, M.B., Lalitha Vijayan, S. Sandaliyan and N. Sridharan, 2011. Status of Wetlands and Wetland Birds in Coimbatore, Trichy, Perambalare and Thiruvavur Districts in Tamil Nadu, India. *World Journal of Zool.*, 6(2): 154-158.