



International Journal of Fauna and Biological Studies

Available online at www.fauajournal.com

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International
Journal of
Fauna And
Biological
Studies

ISSN 2347-2677

IJFBS 2014; 1 (6): 42-49

Received: 01-07-2014
Accepted: 21-08-2014

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Wetland birds of Srikakulam District, Andhra Pradesh, India

R. Sravan kumar, V. Vasudeva Rao, Ch. Sasikala and V. Nagulu

Abstract

Enumerating the species richness is an essential tool to detect changes in avian community structure for their effective management and conservation of species and their habitat. The study area being in the tropical region with varied habitats occurring, hills, plains and coastal plains and well distributed water columns flourishing with the food resources, hosts many wintering and non-wintering birds. The present study determines the bird diversity in wetland habitat types such as marsh, swamp, shallow waters, open water bodies and mangrove at Srikakulam District (18° 20' N and 19° 10' N to 83° 25' E and 84° 50' E), Andhra Pradesh, during November, 2009 to 2013. In the present study, 145 bird species belonging to 48 families of 16 orders and their status were recorded. Conservative measures are also suggested for preventing the degradation of the resources as well educating the local people for conserving the species in the region.

Keywords: Conservation, Avian diversity, Wetland, Srikakulam, Andhra Pradesh.

1. Introduction

Wetlands are the transitional zones between the terrestrial and aquatic ecosystems (Cowardin, 1979) [10]. Wetlands are often described as “kidneys of the landscape” (Mitsch & Gosselink 1986; Jos & Maltby, 2009) [26] and The Asian wetland Bureau, 1991, described wetlands as waterlogged wealth. Anon (1990), defined as all submerged or water saturated lands, natural or man-made, inland or coastal, permanent or temporary, static or dynamic, vegetated or non-vegetated, which necessarily have a land-water interface. In 1967, The International waterfowl and wetland research Bureau (IWRB) an initiated international waterfowl census (IWC) scheme to monitor wintering water birds and to identify the important sites and describe the distribution of species, size and status and the flyways (Mundkur and Taylor, 1993) [27]. It was estimated that India has 58.2 million hectares of area occupied by wetlands, which are considered to be the important repositories of aquatic biodiversity Prasad *et al.*, 2002) [32]. India is an important non-breeding ground for migratory waterfowl in the Central Asia (Namgail *et al.*, 2011) [37]. Though several people carried out recording the avi-fauna of wetlands from India, Rahmani, 2009 [30]; Reddy *et al.*, 2010 [31]; Sebastian *et al.*, 2012 [34], sporadic studies were carried out in Srikakulam district of Andhra Pradesh located between 18° 20' N and 19° 10' N to 83° 25' E and 84° 50' E.

2. Study area

Srikakulam district is located between the northern latitudes of 18° 20' and 19° 10' and between the eastern longitudes of 83° 25' and 84° 50'. Topographically the study area has three geographical divisions, (1) The hilly regions (2) the plains and (3) the coastal plains. The north-west part of the study area consists hilly region (part of Eastern Ghats) and down to south and south-east occurs the Bay of Bengal.

The five main rivers Vamshadhara, Nagavali, Suvarnamukhi, Mahendratanaaya and Bahuda originate from the Eastern Ghats and flow down to the Bay of Bengal through the plains forming a number of perennial and non-perennial/ tanks (>8000) of both major and minor categories which are fed from the systemized channels of these rivers, and other minor non-perennial tanks are rain fed seasonally with an average rainfall of 1162.5 mm. All these water bodies are the main source of irrigation. Apart from this, the district has 14 river mouths with two dwarf mangrove patches distributed along the coast line of 192 km. Long (Fig.1) is the added values in attracting many seasonal migratory birds

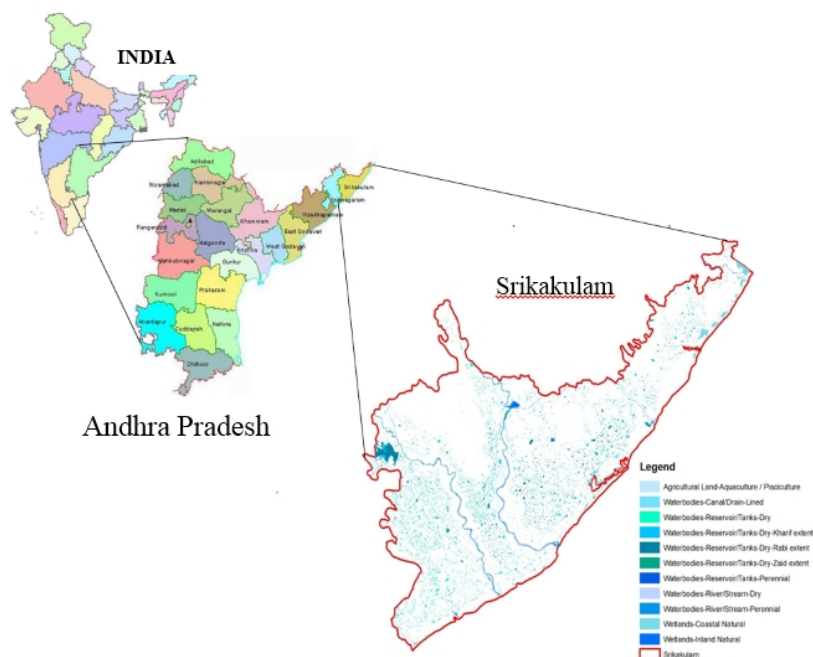


Fig 1: Map showing the distribution of water bodies throughout the Srikakulam district, A.P.

Studies were initiated from 2009 to 2013 to document the fauna of Srikakulam, the rapid surveys were made over the entire district of Srikakulam in the first few months and a number of perennial and non-perennial tanks were identified (Fairfax County Storm Water Planning Division, 2003; Agardi & Alder, 2005; Bruland, 2008 and North Carolina Division of Water Quality, 2010) with the help of GIS tools and Survey of India maps. After being fully acquainted with the distribution of water bodies, main study spots were selected at various divisions of the district to understand the general distribution of birds during the months of October to March for the wintering birds and also in other seasons. The number of field spots was more in Santhabommali, Tekkali, Kotabommali, Saravakota, Nandigam and Vajrapukothuru mandals because of the distribution of a number of water bodies in the elongated plains between the rivers Vamshadhara and Mahendratanya.

3. Materials and methods

All observations were conducted on foot as well as by boat being equipped with 7 X 50 binoculars. Photo records, were obtained with the help of the Nikon P90 (24X optical zoom)

digital camera and Nikon D90 (DSLR) camera aided with 80-400 mm Nikkor telescopic lens.

The bird population was surveyed by line transect method followed by imaginary grid method (Gaston, 1973 [13]; Stewart & Kantrud, 1972 [35]; Burnham *et al.*, 1980 [9], Bibby *et al.*, 1992 [7], Sampath, 1993 [33]; Vasudeva Rao *et al.*, 1996) [38] and point count method (Hostetler & Main, 2001 [17]; Javed & Kaul, 2002) [19]. For making regular observations, areas with maximum density and diversity of bird species were selected and monitored regularly. At all the tanks, biweekly counts were made and the data entered in the prescribed format. At each sampling day observation were made between 6:00 to 11:00 hrs and 16:00 to 18:00 hrs (Emlen, 1974 [11], Joel Prashant, 1991 & 1994 [21, 22] and Bhargavi *et al.*, 1996 [6] and Vasudeva Rao *et al.*, 1997) [39] as it is more favorable for food collection during early morning and time to return back for roosting. During each visit, all the bird species encountered and also the type of vegetation, animal species, pattern of cultivation, extent of human encroachment, extent of reclamation of the tanks, nature of fishing, hunting and trapping of birds and tree felling etc., were also recorded.

Table 1: Check list of wetland birds recorded at Srikakulam District, Andhra Pradesh.

S.NO	Classification /Common name	Scientific name	Abu	Status	IUCN
Order	Podicipediformes				
Family	Podicipedidae				
1	Great crested grebe	<i>Podiceps cristatus</i> Linnaeus, 1758	O	B/WM	LC
2	Little grebe	<i>Tachybaptus ruficollis</i> Pallas, 1764	C	Res/B	LC
Order	Pelecaniformes				
Family	Pelecanidae				
3	Grey pelican	<i>Pelecanus philippensis</i> Gmelin, 1789	O	B/WM	NT
Family	Ardeidae				
4	Grey heron	<i>Ardea cinerea</i> Linnaeus, 1758	C	Res/B	LC
5	Purple heron	<i>Ardea purpurea</i> Linnaeus, 1766	C	Res/B	LC
6	Indian pond heron	<i>Ardeola grayii</i> Sykes, 1832	A	Res/B	LC
7	Cattle egret	<i>Bubulcus ibis</i> Linnaeus, 1758	C	Res/B	LC
8	Large egret	<i>Casmerodius albus</i> Linnaeus, 1758	O	Res/B	LC
9	Little egret	<i>Egretta garzetta</i> Linnaeus, 1766	A	Res/B	LC

10	Reef heron	<i>Egretta gularis</i> Bosc, 1792	R	Res/B	LC
11	Black bittern	<i>Ixobrychus flavicollis</i> Latham, 1790	O	Res/B	LC
12	Median egret	<i>Mesophoyx intermedia</i> Wagler, 1829	C	Res/B	LC
13	Black-crowned night heron	<i>Nycticorax nycticorax</i> Linnaeus, 1758	C	Res/B	LC
Order	Suliformes				
Family	Anhingidae				
14	Oriental darter	<i>Anhinga melanogaster</i> Pennant, 1769	O	Res/B	NT
Family	Phalacrocoracidae				
15	Little cormorant	<i>Phalacrocorax niger</i> Vieillot, 1817	C	Res/B	LC
16	Large cormorant	<i>Phalacrocorax carbo</i> Linnaeus, 1758	O	Res/LM	LC
Order	Ciconiiformes				
Family	Ciconiidae				
17	Asian open billed stork	<i>Anastomus oscitans</i> Boddaert, 1783	A	Res/B	LC
18	Painted stork	<i>Mycteria leucocephala</i> Pennant, 1769	C	Res/LM	NT
Family	Threskiornithidae				
19	Glossy ibis	<i>Plegadis falcinellus</i> Linnaeus, 1766	A	WM	LC
20	Black ibis	<i>Pseudibis papillosa</i> Temminck, 1824	C	Res/B	LC
21	Oriental white ibis	<i>Threskiornis melanocephalus</i> Latham, 1790	C	Res/B	NT
Family	Phoenicopteridae				
22	Lesser flamingo	<i>Phoenicopeterus minor</i> Geoffroy Saint-Hilaire, 1798	O	WM	NT
Order	Falconiformes				
Family	Accipitridae				
23	Besra sparrowhawk	<i>Accipiter virgatus</i> Temminck, 1822	C	Res/B	LC
24	Cinereous vulture	<i>Aegyptius monachus</i> Linnaeus, 1766	R	Res/B	NT
25	Short-toed snake eagle	<i>Circaetus gallicus</i> Gmelin, 1788	C	LM	LC
26	Western marsh-harrier	<i>Circus aeruginosus</i> Linnaeus, 1758	O	WM	LC
27	Hen harrier	<i>Circus cyaneus</i> Linnaeus, 1760	C	WM	LC
28	Black-shouldered kite	<i>Elanus axillaris</i> Latham, 1802	C	Res/B	LC
29	White bellied sea eagle	<i>Haliaeetus leucogaster</i> Gmelin, 1788	C	Res/B	LC
30	Pallas's fish eagle	<i>Haliaeetus leucoryphus</i> Pallas, 1771	C	Res/B	VU
31	Brahminy kite	<i>Haliastur indus</i> Boddaert, 1783	C	Res/B	LC
32	Booted eagle	<i>Hieraetus pennatus</i> Gmelin, 1788	R	LM	LC
33	Black kite	<i>Milvus migrans</i> Boddaert, 1783	C	Res/B	LC
34	Osprey	<i>Pandion haliaetus</i> , Linnaeus, 1758	O	Res	LC
35	Changeable hawk-eagle	<i>Spizaetus nipalensis</i> Hodgson, 1836	R	LM	LC
Order	Anseriformes				
Family	Anatidae				
36	Northern pintail	<i>Anas acuta</i> Linnaeus, 1758	A	WM	LC
37	Northern shoveler	<i>Anas clypeata</i> Linnaeus, 1758	A	WM	LC
38	Common teal	<i>Anas crecca</i> Linnaeus, 1758	C	LM	LC
39	Eurasian wigeon	<i>Anas penelope</i> Linnaeus, 1758	C	WM	LC
40	Mallard	<i>Anas platyrhynchos</i> Linnaeus, 1758	C	WM	LC
41	Spot-billed duck	<i>Anas poecilorhyncha</i> Forster, 1781	C	LM	LC
42	Garganey	<i>Anas querquedula</i> Linnaeus, 1758	C	WM	LC
43	Common pochard	<i>Aythya ferina</i> Linnaeus, 1758	C	WM	LC
44	Tufted pochard	<i>Aythya fuligula</i> Linnaeus, 1758	C	WM	LC
45	Ferruginous pochard	<i>Aythya nyroca</i> Gldenstdt, 1770	C	WM	LC
46	Large whistling-duck	<i>Dendrocygna bicolor</i> Vieillot, 1816	A	LM	LC
47	Lesser whistling-duck	<i>Dendrocygna javanica</i> Horsfield, 1821	C	Res/B	LC
48	Red-crested pochard	<i>Netta rufina</i> Pallas, 1773	C	WM	LC
49	Cotton teal	<i>Nettapus coromandelianus</i> Gmelin, 1789	C	LM	LC
50	Comb duck	<i>Sarkidiornis melanotos</i> Pennant, 1769	C	WM	LC
51	Brahminy shelduck	<i>Tadorna ferruginea</i> Pallas, 1764	C	WM	LC
52	Bar-headed goose	<i>Anser indicus</i> Latham, 1790	R	WM	LC
Order	Galliformes				
Family	Phasianidae				
53	Grey francolin	<i>Francolinus pondicerianus</i> Gmelin, 1789	C	Res/B	LC
Order	Gruiformes				
Family	Rallidae				
54	White-breasted waterhen	<i>Amaurornis phoenicurus</i> Pennant, 1769	C	Res/B	LC
55	Common coot	<i>Fulica atra</i> Linnaeus, 1758	A	Res/B	LC
56	Watercock	<i>Gallirex cinerea</i> Gmelin, 1789	C	Res/B	LC
57	Common moorhen	<i>Gallinula chloropus</i> Linnaeus, 1758	C	Res/B	LC
58	Purple moorhen	<i>Porphyrio porphyrio</i> Linnaeus, 1758	C	Res/B	LC
59	Ruddy-breasted crane	<i>Porzana fusca</i> Linnaeus, 1766	O	Res/B	LC
Order	Charadriiformes				
Family	Jacaniidae				

60	Pheasant-tailed jacana	<i>Hydrophasianus chirurgus</i> Scopoli, 1786	C	B/WM	LC
61	Bronze winged jacana	<i>Metopidius indicus</i> Latham, 1790	C	Res/B	LC
Family	Charadriidae				
62	Kentish plover	<i>Charadrius alexandrinus</i> Linnaeus, 1758	C	WM	LC
63	Little ringed plover	<i>Charadrius dubius</i> Scopoli, 1786	C	Res/B	LC
64	Common ringed plover	<i>Charadrius hiaticula</i> Linnaeus, 1758	C	WM	LC
65	Greater sand plover	<i>Charadrius leschenaultii</i> Lesson, 1826	C	Res/B	LC
66	Lesser sand plover	<i>Charadrius mongolus</i> Pallas, 1776	C	Res/B	LC
67	European golden plover	<i>Pluvialis apricaria</i> Linnaeus, 1758	C	WM	LC
68	Grey plover	<i>Pluvialis squatarola</i> Linnaeus, 1758	O	WM	LC
69	Grey-headed lapwing	<i>Vanellus cinereus</i> Linnaeus, 1758	O	LM	LC
70	Red-wattled lapwing	<i>Vanellus indicus</i> Boddaert, 1783	C	Res/B	LC
71	Yellow-wattled lapwing	<i>Vanellus malabaricus</i> Boddaert, 1783	C	Res/B	LC
Family	Scolopacidae				
72	Common sandpiper	<i>Actitis hypoleucos</i> Linnaeus, 1758	C	Res	LC
73	Sanderling	<i>Calidris alba</i> Pallas, 1764	O	WM	LC
74	Dunlin	<i>Calidris alpina</i> Linnaeus, 1758	O		LC
75	Curlew sandpiper	<i>Calidris ferruginea</i> Pontoppidan, 1813	C	WM	LC
76	Little stint	<i>Calidris minuta</i> Leisler, 1812	A	WM	LC
77	Temminck's stint	<i>Calidris temminckii</i> Leisler, 1812	C	WM	LC
78	Common snipe	<i>Gallinago gallinago</i> Linnaeus, 1758	C	Res/B	LC
79	Black-tailed godwit	<i>Limosa limosa</i> Linnaeus, 1758	C	WM	LC
80	Jack snipe	<i>Lymnocyrtus minimus</i> Brunnich, 1764	C	Res/B	LC
81	Eurasian curlew	<i>Numenius arquata</i> Linnaeus, 1758	R	WM	NT
82	Ruff	<i>Philomachus pugnax</i> Linnaeus, 1758	O	B/WM	LC
83	Spotted redshank	<i>Tringa erythropus</i> Pallas, 1764	O	WM	LC
84	Wood sandpiper	<i>Tringa glareola</i> Linnaeus, 1758	C	Res	LC
85	Nordmann's greenshank	<i>Tringa guttifer</i> Nordmann, 1835	C	WM	EN
86	Common greenshank	<i>Tringa nebularia</i> Gunnerus, 1767	C	WM	LC
87	Marsh sandpiper	<i>Tringa stagnatilis</i> Bechstein, 1803	C	Res	LC
88	Common redshank	<i>Tringa totanus</i> Linnaeus, 1758	C	WM	LC
Family	Rostratulidae				
89	Greater painted-snipe	<i>Rostratula benghalensis</i> Linnaeus, 1758	C	Res/B	LC
Family	Recurvirostridae				
90	Black-winged stilt	<i>Himantopus himantopus</i> Linnaeus, 1758	C	Res/B/LM	LC
91	Pied avocet	<i>Recurvirostra avocetta</i> Linnaeus, 1758	C	WM	LC
Family	Glareolidae				
92	Small pratincole	<i>Glareola lactea</i> Temminck, 1820	C	WM	LC
93	Collared pratincole	<i>Glareola pratincola</i> Linnaeus, 1766	C	Res/LM	LC
Family	Laridae				
94	Brown-headed gull	<i>Chroicocephalus brunnicephalus</i> Jerdon, 1840	C	WM	LC
Family	Sternidae				
95	Gull-billed tern	<i>Gelochelidon nilotica</i> Gmelin, 1789	C	WM	LC
96	Indian river tern	<i>Sterna aurantia</i> J.E. Gray, 1831	C	Res	NT
97	Common tern	<i>Sterna hirundo</i> Linnaeus, 1758	C	Res/LM	LC
98	Black-napped tern	<i>Sterna sumatrana</i> Raffles, 1822	O	WM	LC
Order	Columbiformes				
Family	Columbidae				
99	Blue rock pigeon	<i>Columba livia</i> Gmelin, 1789	C	Res/B	LC
100	Spotted dove	<i>Spilopelia chinensis</i> Scopoli, 1768	C	Res/B	LC
101	Little brown dove	<i>Streptopelia senegalensis</i> Blyth, 1842	C	Res/B	LC
102	Eurasian collared dove	<i>Streptopelia decaocto</i> Frivaldszky, 1838	C	Res/B	LC
Order	Psittaciformes				
Family	Psittacidae				
103	Alexandrine parakeet	<i>Psittacula eupatria</i> Linnaeus, 1766	C	Res/B	LC
104	Rose-ringed parakeet	<i>Psittacula krameri</i> Scopoli, 1769	A	Res/B	LC
Order	Cuculiformes				
Family	Cuculidae				
105	Pied crested cuckoo	<i>Clamator jacobinus</i> Boddaert, 1783	C	WM	LC
106	Asian koel	<i>Eudynamis scolopaceus</i> Linnaeus, 1758	C	Res/B	LC
Order	Strigiformes				
Family	Strigidae				
107	Spotted owl	<i>Athene brama</i> Temminck, 1821	C	Res/B	LC
Order	Apodiformes				
Family	Apodidae				
108	Asian palm swift	<i>Cypsiurus balasiensis</i> J.E. Gray, 1829	C	Res/B	LC
109	House swift	<i>Apus affinis</i> J.E. Gray, 1830	C	Res/B	LC

Order	Coraciiformes				
Family	Alcedinidae				
110	Small blue kingfisher	<i>Alcedo atthis</i> Linnaeus, 1758	C	Res/B	LC
Family	Cerylidae				
111	Pied kingfisher	<i>Ceryle rudis</i> Linnaeus, 1758	C	Res/B	LC
Family	Halcyonidae				
112	Black-capped kingfisher	<i>Halcyon pileata</i> Boddaert, 1783	C	Res/B	LC
113	White-breasted kingfisher	<i>Halcyon smyrnensis</i> Linnaeus, 1758	C	Res/B	LC
Family	Meropidae				
114	Small bee-eater	<i>Merops orientalis</i> Latham, 1802	C	Res/B	LC
115	Blue-tailed bee-eater	<i>Merops philippinus</i> Linnaeus, 1766	C	Res	LC
Family	Coraciidae				
116	Indian roller	<i>Coracias benghalensis</i> Linnaeus, 1758	C	Res/B	LC
Family	Upupidae				
117	Common hoopoe	<i>Upupa epops</i> Linnaeus, 1758	C	Res/B	LC
Family	Bucerotidae				
118	Indian grey hornbill	<i>Ocyrceros birostris</i> Shaw, 1786	C	Res/B	LC
Order	Passeriformes				
Family	Alaudidae				
119	Ashy-crowned sparrow lark	<i>Eremopterix griseus</i> Scopoli, 1786	C	Res/B	LC
120	Common crested lark	<i>Galerida cristata</i> Linnaeus, 1758	C	Res/B	LC
Family	Hirundinidae				
121	Red-rumped swallow	<i>Cecropis daurica</i> Laxmann, 1769	A	Res/B	LC
122	Barn swallow	<i>Hirundo rustica</i> Linnaeus, 1758	C	Res/B	LC
Family	Laniidae				
123	Brown shrike	<i>Lanius cristatus</i> Linnaeus, 1758	C	Res/B	LC
Family	Oriolidae				
124	European golden oriole	<i>Oriolus oriolus</i> Linnaeus, 1758	C	Res/B	LC
Family	Dicruridae				
125	Black drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	C	Res/B	LC
Family	Sturnidae				
126	Common myna	<i>Acridotheres tristis</i> Linnaeus, 1766	C	Res/B	LC
127	Asian pied starling	<i>Gracupica contra</i> Linnaeus, 1758	C	Res/B	LC
Family	Corvidae				
128	Indian jungle crow	<i>Corvus culminatus</i> Sykes, 1832	C	Res/B	LC
129	House crow	<i>Corvus splendens</i> Vieillot, 1817	A	Res/B	LC
Family	Pycnonotidae				
130	Red-vented bulbul	<i>Pycnonotus cafer</i> Linnaeus, 1766	C	Res/B	LC
Family	Acrocephalidae				
131	Oriental reed warbler	<i>Acrocephalus orientalis</i> Temminck & Schlegel, 1847	C	Res/B	LC
Family	Cisticolidae				
132	Streaked fantail warbler	<i>Cisticola juncidis</i> Rafinesque, 1810	C	Res/B	LC
Family	Turdinae				
133	Pied bushchat	<i>Saxicola caprata</i> Linnaeus, 1766	C	Res/B	LC
Family	Motacillidae				
134	Paddyfield pipit	<i>Anthus rufulus</i> Vieillot, 1818	C	Res/B	LC
135	Citrine wagtail	<i>Motacilla citreola</i> Pallas, 1776	O	WM	LC
136	Yellow wagtail	<i>Motacilla flava</i> Linnaeus, 1758	O	WM	LC
137	Grey wagtail	<i>Motacilla cinerea</i> Tunstall, 1771		WM	LC
Family	Cisticolidae				
138	Ashy prinia	<i>Prinia socialis</i> Sykes, 1832	C	Res/B	LC
139	Jungle prinia	<i>Prinia sylvatica</i> Jerdon, 1840	C	Res/B	LC
Family	Ploceidae				
140	Black-breasted weaver	<i>Ploceus benghalensis</i> Linnaeus, 1758	C	Res/B	LC
141	Baya weaver	<i>Ploceus philippinus</i> Linnaeus, 1766	A	Res/B	LC
Family	Estrildidae				
142	Red avadavat	<i>Amandava amandava</i> Linnaeus, 1758	C	Res/B	LC
143	Black-headed munia	<i>Lonchura atricapilla</i> Vieillot, 1807	C	Res/B	LC
144	White-throated munia	<i>Lonchura malabarica</i> Linnaeus, 1758	A	Res/B	LC
Family	Nectariniidae				
145	Purple-rumped sunbird	<i>Leptocoma zeylonica</i> Linnaeus, 1766	C	Res/B	LC

Abu= Abundance, C= Common, A= Abundant, R= Rare, O= Occasional; Res= Residential, B= Breeding, LM= Local migrant, WM= Winter migrant; IUCN= International Union for Conservation of Nature, LC= Least concerned, NT= Near threatened, VU= Vulnerable, EN= Endangered

The classification and identification of the species with their status are given with reference to, Ali, S. 1996; Grimmet, 1998 & 2001, Manakadan, R. & A. Pittie, 2001; Satish, 2009 and Indian Bird Conservation Network, IUCN-Threatened Bird list of July, 2014. Gill F. & Donsker D. (eds). 2010.

Table 2: Status of waterfowls recorded in Srikakulam district

S.NO	ORDER	Family	Genus	Species	Abundance				Status				IUCN STATUS			
					C	A	R	O	Res	B	WM	LM	LC	NT	VU	EN
1	Podicipediformes	1	2	2	1			1	1	1	1		2			
2	Pelecaniformes	2	9	11	5	2	1	3	10	11	1		10	1		
3	Suliformes	2	2	3	1			2	3	2		1	2	1		
4	Ciconiiformes	3	6	6	3	2		1	4	3	2	1	3	3		
5	Falconiformes	1	10	13	8		3	2	8	7	2	3	11	1	1	
6	Anseriformes	1	8	17	13	3	1		1	1	12	4	17			
7	Galliformes	1	1	1	1				1	1			1			
8	Gruiformes	1	6	6	4	1		1	6	6			6			
9	Charadriiformes	8	20	39	30	1	1	7	16	12	21	4	36	2		1
10	Columbiformes	1	3	4	4		4		4	4			4			
11	Psittaciformes	1	1	2	1	1			2	2			2			
12	Cuculiformes	1	2	2	2				1	1	1		2			
13	Strigiformes	1	1	1	1				1	1			1			
14	Apodiiformes	1	2	2	2				2	2			2			
15	Coraciiformes	7	7	9	9				9	8			9			
16	Passeriformes	16	21	27	20	4		2	24	24	3		27			
Total	16	48	101	145	105	14	10	19	93	86	43	13	135	8	1	1

Abu= Abundance, C= Common, A= Abundant, R= Rare, O= Occasional; Res= Residential, B= Breeding, LM= Local migrant, WM= Winter migrant; IUCN= International Union for Conservation of Nature, LC= Least concerned, NT= Near threatened, VU= Vulnerable, EN= Endangered

4. Results and discussions

Avifaunal composition of Srikakulam District is represented by 145 species belonging to 16 orders and 48 families (Table.1). Of the total, 93 species of water birds, inhabiting in the open water and in the wetland vegetation. 52 species were terrestrial which comes in close contact with water birds using same habitat both for perching or nesting and also as feeding grounds. 56 species were recorded as migratory of which 43 are winter migrants and of which 4 species were recorded breeding in the area, 13 species are classified as local migrant and of which 5 are known as resident species found in all the seasons and also recorded 1 species breeding. 88 species are resident birds which are regularly observed feeding and breeding. 14 species are listed as dominant in the perennial and non-perennial tanks based on the density. For the first time, Great crested grebes (*Tachybaptus ruficollis*) were recorded from this region. Among the orders, the predominant orders include Anseriformes followed by Ciconiiformes, Charadriiformes, and Pelicaniformes. Over 92 species of birds are utilizing the tanks for their feeding and breeding, out of them 25 species of water birds are seen with nesting. 42 species are economically important birds. 105 species are common that are observed regularly during the season. 25 species are recorded rare and occasional. Of all the 145 species recorded, 135 species are classified as least concerned (LC) followed by 8 species as near threatened (NT) and also recorded vulnerable (VU) and endangered (EN) species 1 each as per the IUCN red list, 2014.

The important Orders with species richness more than 5 species, their status and occurrence were recorded and are as follows:

1. Charadriiformes: This order is represented by 39 species belonging to 8 families, important among them are Scolopacidae (17 species), Charadriidae (10 species), Sturnidae (4 species), Jacanidae, Recurvirostridae, Glariolidae represented with 2 species each. About 41% species are residents, while 10.25% are local migrants and 30.76% are winter migrants. 12 species (30.7%) of the total breeding bird records belong to this order. The

majority of species represented in the region are common (77%) and occasional (18%) in occurrence (2%).

Among all the 39 species Pheasant-tailed jacana, Kentish plover, common ringed plover, Curlew sandpiper, little stint, Temminck's stint, Black-tailed godwit, Eurasian curlew, Nordmann's greenshank, Common greenshank, Common redshank, Pied avocet, Small pratincole, Brown-headed gull, Gull-billed tern, Grey plover, Sanderling, Ruff, Spotted redshank, Black-napped tern are very common and occasional in occurrence.

- 2. Passeriformes:** This order represented by 27 species belonging to 16 families. The species occurrence in all these families ranging between 2-4 species. The low species occurrence of this order mainly due to the restricted counting of birds in wetland and associated habitats. About 88% of birds observed are resident and breeding and 74% of the birds are common to the region; 15% of the species are abundant in nature. Occasionally sighted species are citrine wagtail (*Motacilla citreola*) and Yellow wagtail (*Motacilla flava*).
- 3. Anseriformes:** This order is represented by a single family and 17 species, of which 12 species (70.6%) were winter migrants, while 4 species (23.5%) are local migrants to this area. 3 species (17.6%) namely Northern pintail (*Anas acuta*), Northern shoveller (*Anas clypeata*) and large whistling duck (*Dendrocygna bicolor*) were abundant; 13 species (76%) were common, while one species (5.8%) was rare in occurrence. Bar headed goose (*Anser indicus*) recorded is probably the first report from this area.
- 4. Falconiformes:** This order represented by 1 family and 13 species, of which 8 species (61.5%) were common, 3 species (23%) were rare, while 2 species (15.4%) were occasional in occurrence. Of the total 13 species recorded, 8 species (61.5%) were resident, 7 species (53.8%) breeders, 3 species (23%) local migrants and 2 species

(15.4%) were winter migrants to this region. Occasional sightings were that of Western marsh-harrier (*Circus aeruginosus*) and Osprey (*Pandion haliaetus*).

5. **Pelecaniformes:** This order is represented by 2 families and 11 species of which 8 species (72.7%) were resident, 7 species (63.4%) breeders, 3 species (27.3%) local migrants and 2 species (18.2%) were winter migrants. Of the total 11 species recorded, 5 species (45.5%) were common, 3 species (27.3%) occasional, 2 species (18.2%) abundant and 1 species (9%) were rare in occurrence in the region. The important species reported in the region includes, Grey Pelican (*Pelecanus philippensis*), Large egret (*Casmerodius albus*) and Black bittern (*Ixobrychus flavicollis*).
6. **Coraciiformes:** Nine species belonging to 7 families represent this order, of which 9 (100%) were common to the region. Among the species recorded, 89% of birds recorded breeding in the region.
7. **Ciconiiformes:** This order represented by 3 families with 6 species, of which 3 species (50%) were common, 2 species (33.3%) abundant and 1 species (16.7%) were occasional in nature. 4 species (66.4%) were resident, 3 species (50%) were breeders, 2 species (33.3%) were winter migrants and 1 species (16.6%) was local migrant in the region. The most abundant species of this order include Asian open billed stork (*Anastomus oscitans*) and Glossy ibis (*Plegadis falcinellus*).
8. **Gruiformes:** This is represented by 6 species belonging to 1 family. All the species are resident and breeding in the region. Of the total 6 species recorded, 4 species (66.7%) were common and 1 species each (16.7%) were recorded abundant and occasional in occurrence.

Rich and varied avi fauna recorded from these wetlands is mainly because of varied habitats of the region and also availability of mangrove patches and mud flats, has played a vital role in attracting a large number of waders to this region. The increasing anthropogenic activities are responsible for the deterioration of the water quality, siltation, vegetation changes, cattle grazing and poaching activity which is recorded as some of the disturbing factors and these are the major factors which cause deterioration of wetlands exists in the study area. Similar observations were recorded elsewhere in India by Anjaneyulu, 1984 & 1992^[3, 4], Vijayan, 1987 & Vijayan *et al.*, 2004^[40, 41]; Sampath, 1993^[33]; Trisal, 1993^[36], Vasudeva Rao *et al.*, 1996^[38]; Kennish, 2002; Reddy, 2010^[31] and Sebastian *et al.*, 2012^[34]. Steps should be taken to protect this fragile landscape by educating the local people about the importance of this ecosystem in attracting large number of winter migrants and also several important breeding birds.

5. Acknowledgements

The authors' sincerely acknowledge the generous funding support received from East Coast Energy Pvt. Ltd., Hyderabad, for smooth conducting of field studies at Srikakulam District. We extend our sincere thanks to Acharya N. G. Ranga Agricultural University, Rajendranagar, Hyderabad and Jawaharlal Nehru Technological University, Kukatpally, Hyderabad for cooperation and permitting to

conduct studies. Finally, we extend our thanks to the AP forest Department for granting permission to collect data and to their regional team, Forest dept., Srikakulam for being in constant interactive support during the study period.

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