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Status of waterbirds in East Godavari River Estuarine Ecosystem (EGREE), Andhra Pradesh

Abstract

This paper presents the findings of a two year study carried out in East Godavari River Estuarine Ecosystem (EGREE) including the Coringa Wildlife Sanctuary to document the status and distribution of waterbirds between 2012 and 2014. . During the study, ten major waterbird congregation sites were identified and seven new waterbird species were recorded. Over 78,000 - 88,000 waterbirds were recorded utilizing EGREE region annually for feeding and breeding. The role of EGREE Region in maintaining the global population of major wintering waterfowl and waders is evident through the population estimates of individual species. It is established that this region regularly supports over 1% of biogeographical population belonging to 17 waterbirds. The EGREE is an important area for the waders as over 47-48 % of the waterbirds recorded in EGREE were waders. Of the 84 species of waders reported from India, 51 species have been recorded in EGREE. Thus, it plays an important role for the fragile wader groups in the Central Asian Flyway (CAF).

Keywords : *EGREE, Coringa, Godavari, Kakinada, Waterbirds, Waders, AWC.*

Introduction

Waterbirds are one of the key attributes of the biodiversity of many wetlands, and waterbird counts form one of the several elements that are used to identify important wetlands. It is widely accepted that the number of waterbirds using a wetland site is a good indicator of that site's biological importance (Scott 1980). Kushlan (1993) assessed the value of waterbirds as bio-indicators of wetland change, and one of his conclusions was that "population level data show special promise as sentinel bio-indicators". Statistics on the status and trends in numbers of waterbirds are required for the conservation of bird populations and biodiversity, as well as for the conservation of their (wetland) habitats.

Monitoring, conservation and sustainable management of waterbird populations have also been the subject of international agreements, cooperation and instruments such as the Ramsar Convention on Wetlands, the Convention on Migratory Species (CMS), the African-Eurasian Migratory Waterbird Agreement and the Partnership for the East Asian - Australasian Flyway. Waterbirds play a crucial role in the wetland ecosystem, and also provide vital evidence of the need to provide statutory protection for certain wetlands; many studies elsewhere have assessed the value of waterbirds as bio-indicators of wetland change, and one of the conclusions was that "population level data show special promise as sentinel bio-indicators".

The Coringa Wildlife Sanctuary and the adjoining mangroves in the East Godavari River Estuarine Ecosystem (EGREE) are one of the major waterbird habitats along the east-coast of India. Though the region holds diversity of waterbirds, the species wise population knowledge is unclear. Except Asian Waterbird Census (AWC) conducted from 1993 to 1996 and later during 2002 and 2003, no systematic study had been done here. Moreover, the avifauna records of the region are also more than a decade old and it cannot be used for present ecosystem management activities. Hence, many authors/researchers suggested that the area needs detailed investigation on its bird life (Islam and Rahmani 2004, 2008, Kannan and Pandiyan 2012). The research gaps were analyzed by the Wildlife Institute of India (WII) and also found out that there exists several gaps in research related to birds (Sivakumar *et al*. 2012). Hence, this study was carried out from from June, 2012. The present paper is based on the two year study on the status of waterbirds in EGREE region with special emphasis on conservation aspects.

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Methodology

Study Area

The study was conducted in the East Godavari River Estuarine Ecosystem ((EGREE) located between 16^0 30'00" -17^0 N and $082^0$0'00"- $080^0$23' 0"E in the East Godavari District of Andhra Pradesh encompassing the Godavari Mangroves (321 km^2) which is the second largest mangrove forests along the east coast of India after Sundarbans. The Godavari Mangroves comprises of the Coringa Wildlife Sanctuary (CWLS) and six Reserve Forests *viz*. Rathikalava, Masanitippa, Maltatippa, Balusutippa, Kothapalem and Kandikuppa. The landscape/ seascape of the EGREE is characterized by rivers and channels, flood plains, natural levees, mangrove forests, tidal channels, tidal flats, lagoon, Kakinada Bay, sand spits, mainland beaches, sand dunes and paleo sand ridges. The area is rich in floral and faunal diversity. Preliminary bird surveys were carried out in the study area between January and March, 2012 and 10 major waterbird congregation areas were concluded. Monthly surveys were conducted in all the 10 congregation areas (Map 1).

Methods

The day an individual of a species was sighted for the first time, it was considered as the arrival date of the particular species. Similarly, the last date when an individual of a species was sighted in a particular year was considered as its departure date (Oring and Lank 1982). The waterbird population in different areas were counted monthly by direct counts (Spindler *et al*. 1981). The bird congregations were approached as close as possible for counting without disturbing. In marshy areas and open waters, the total number of birds was counted from a boat (Bailey and Titman 1984, Sjoberg 1989). On encountering a bird flock, the boat was anchored in a convenient vantage point where the birds could easily be observed and counted. Conspicuous species present in a relatively small numbers or dispersed widely were counted singly, whereas, the number of birds in large flocks was generally estimated by mentally dividing the congregation into small groups of 10 to 100 depending on the size of the flock, and counting the number of groups. Waterbirds species were counted individually or in units of 10 when flocks were upto 5000 individuals. Very large flocks (> 5,000) were counted in units of 100 to 500 (Reeber, 2000). At least ten groups of each flock were counted species-wise to find the average of each species per group. The mean number for individual per species was multiplied with the number of groups to get their total number. If there was a wide variation in the numbers counted for individual species within the groups of a same flock, a separate mean estimation was made for groups approximately with similar species and similar numbers. Certain species spent the daylight hours in agricultural landscapes; were missed during counts. These species were enumerated as they flew to or from their roost sites at dawn or dusk, since they often follow traditional flight lines to approach or leave the site. For the tidal wetland, surveys were mostly done during the low tide times. Surveys were done in the heronries during the breeding season. Waterbird Population Estimates (fifth edition) was refered (Wetlands International, 2012) to check the 1% threshold biogeographical population of the waterbirds of the study area.

Result and Discussion

Rao *et al*. (1996) listed 236 bird species from the Coringa Wildlife Sanctuary. Later, 14 more bird species were reported by Pitte and Taher (2004), Islam and Rahmani (2008) and Li *et al*. (2009). All the previous records of birds were compiled and updated with new records of the present study. During this study 15 new records have been added to the bird list of Coringa WLS, A total of 264 bird species have been recorded.. Of these, 128 species are waterbirds, 12 are globally threatened, nine are Near Threatened and 92 are migratory. Among the waterbirds Grey-headed lapwing *Vanellus cinereus* Heuglin's Gull *Larus heuglini* Lesser Crested tern *Sterna bengalensis,* Great Crested tern *Sterna bergii,* White-winged tern *Chlidonias leucopterus* and Indian skimmer *Rynchops albicollis* were the new records reported during the study period. As per the available record, it could be understood that it is the first authentic record (Pitttie *et al*. 2005) for White-winged Tern along the Andhra Pradesh Coast (divided) and second record for the united Andhra Pradesh; and it is the recent record for Indian Skimmer in Andhra Pradesh after 1989 reported by Scott (1989) and Taher and Pittie (1989).

As per the arrival of migratory waterbirds are concerned, the dabblers and long distance migrant waterfowl of EGREE Region *viz*. Northern shoveller *Anas clypeata*, Northern Pintail *Anas acuta*, Garganey *Anas querqudula* and Gadwall *Anas strepera*, are the early visitors to the region who arrive during last week of October onwards. The other common dabbling ducks Eurasian wigeon *Anas penelope* and Ruddy Shelduck *Tadorna ferruginea* arrive during November. The gulls arrive at the end of October, and stay up to May. Among the gulls, the last one to leave the region is Black-headed gull *Larus ridibundus* .The arrival of waders *viz*. Lesser Sand plover *Charadrius mongolus* and Common redshank *Tringa totanus* were observed as early as the first week of August. Among all the migratory groups of waterbirds, the last one to leave the EGREE Region was the waders. Over summering in considerable numbers was also recorded in 15 migratory species of waders. The Spot-billed pelicans were seen from December to September, and sometimes a few individuals up to October with peak numbers in May and June.

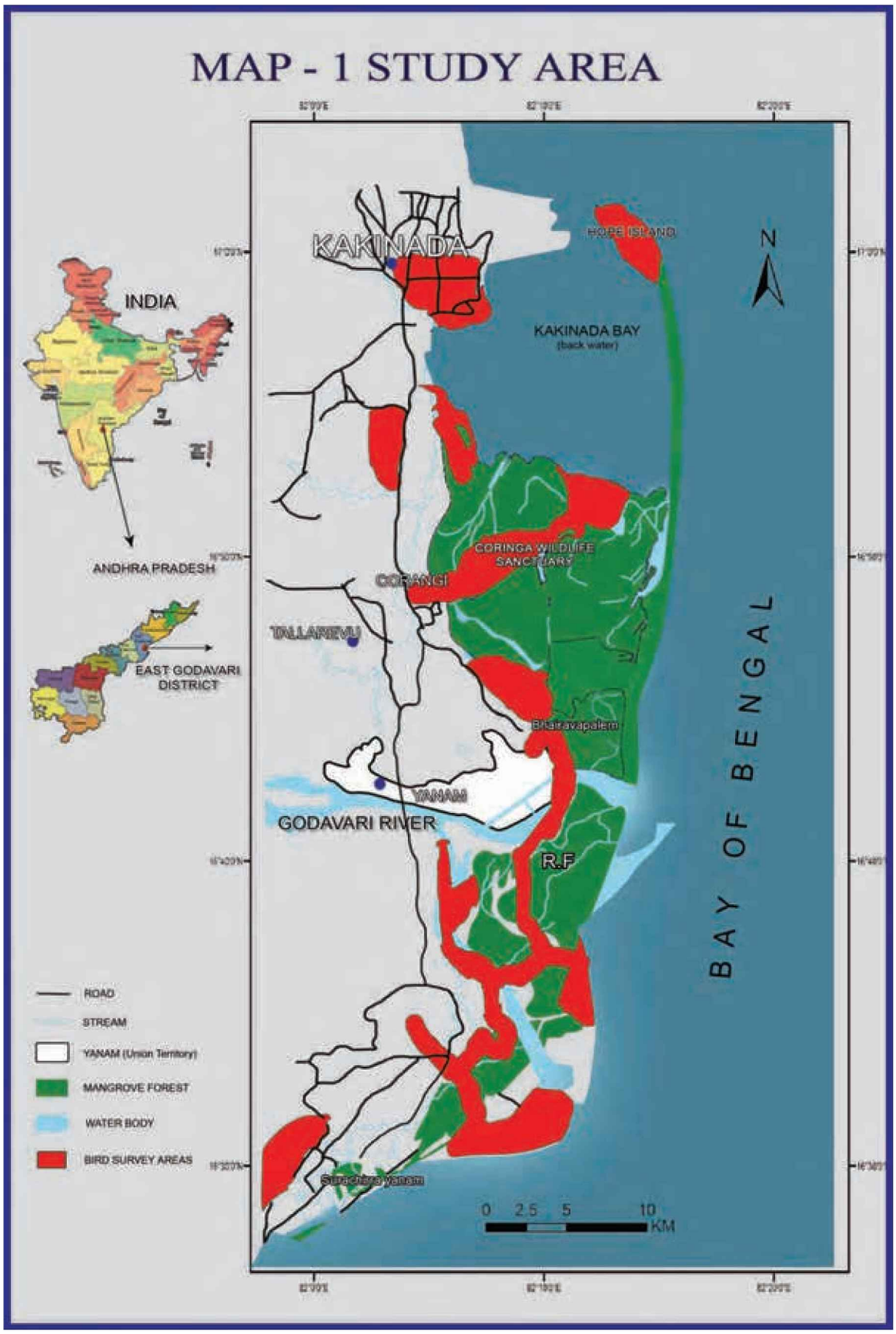

Figure 1 : *Map of the study area East Godavari River Estuarine Ecosystem*

Status of waterbirds in East Godavari River Estuarine Ecosystem (EGREE), Andhra Pradesh

Data on bird population was obtained for two complete migratory seasons (2012-2013 & 2013-2014). The bird populations started to increase at EGREE Region from September onwards which coincided with the arrival of migratory waterbirds. Though sporadic arrival of waders (Lesser Sand plover, Common redshank etc.) ducks and other waterbirds were also observed from September/October and the numbers started increasing from November, which increased steadily and the peak was recorded in December in both the seasons.

During the study, over 60,000 – 70,000 birds were recorded in EGREE region during the winter (Figure1). The number of Waterbirds in different congregation zones during the study, fluctuated among the months and seasons. Furthermore, it was observed that various bird species utilize the wetland during different periods of the same season, which made the difference in the total count as well.

It could be understood from the population records that the region regularly support over 1% of biogeographical population belonging to 17 waterbird species (Table 1). The overall waterbird population and 1% biogeographical population records of EGREE Region fulfills the Ramsar Criteria No.5 & 6. Islam and Rahmani (2004 & 2008) projected the study area as an Important Bird Area (IBA) and have recommended the potential to be declared as a Ramsar Site. This first comprehensive study in the EGREE Region supports the importance of this by documenting the bird species in which the numbers exceeded the 1% threshold biogeographical of the species.

Table 1 : Species of waterbirds in EGREE whose numbers exceeded 1% biogeographical threshold

S. No.	Common Name	Scientific Name	1 % Threshold	Number recorded in EGREE during 2012-13 & 2013-14 Migratory season*
01	Little Egret	*Egretta garzetta*	1400	1900 – 3200
02	Great Egret	*Casmerodius albus*	1000	2850 – 5000
03	Painted Stork	*Mycteria leucocephala*	2200	2200 – 2500
04	Asian Openbill-Stork	*Anastomus oscitans*	3000	3500 – 6800
05	Pacific Golden-Plover	*Pluvialis fulva*	710	2000 – 4700
06	Kentish Plover	*Charadrius alexandrinus*	710	750 – 1000
07	Lesser Sand Plover	*Charadrius mongolus*	1300	4000 – 6000
08	Black-tailed Godwit	*Limosa limosa*	1500	3100 – 5000
09	Whimbrel	*Numenius phaeopus*	1000	1000 – 1500
10	Common Redshank	*Tringa totanus*	1000	2800 – 5000
11	Little Stint	*Calidris minuta*	2400	4500 – 8000
12	Curlew Sandpiper	*Calidris ferruginea*	2400	2800 – 6000
13	Black-winged Stilt	*Himantopus himantopus*	1700	2850 – 4000
14	Small Pratincole	*Glareola lactea*	710	1500 – 2500
15	Brown-headed Gull	*Larus brunnicephalus*	1400	2500 – 4000
16	Little Tern	*Sterna albifrons*	1000	1300 - 1500
17	Whiskered Tern	*Chlidonias hybrida*	1000	1600– 2500

** Data given here is rounded to the nearest 50s and 100s*

The waterbirds counted in the region never went below the 11,000, due to the following reasons: One is the considerable number of over summering waders observed and the second is breeding of heronry birds in two spells and second due to the breeding of over 700 pairs of Painted storks *Mycteria leucocephala,* 200 pairs of Darter *Anhinga melanogastor* along with Little egret *Egretta garzetta*, Grey heron, *Ardea cinerea* and Black-crowned Night-heron *Nycticorax nycticorax* between February and June; also over 900 pairs of Asian openbill-stork and 300 pairs of Little cormorant were observed between June and October in the EGREE Region. It is noteworthy to mention that none of the previous studies had mentioned about the heronry except about the breeding records of egrets, which led to the speculation that the heronry in the EGREE Region might be a recently established one.

As per the Asian Waterbird Census (AWC) data between 1993 and 1996 by Pittie & Taher (2004), an increase in the total number of waterbirds from 2,911 in 1993 to 16,775 in 1996 was observed. The data have been mostly collected from the Coringa Wildlife Sanctuary. Though 10 major congregation areas were identified during the study, over 60% of the

Annexure - 1 : Details of the waterbirds recorded regularly in EGREE region during 2012-2013 & 2013-2014 migratory seasons

Sl. No.	Common name	Scientific Name	Maximum numbers recorded monthly bird count)		AWC Data	
			2014	2013	2014	2013
1	Little Grebe	*Tachybaptus ruficollis*	460	298	6	36
2	Spot billed Pelican	*Pelecanus philippensis*	60	48	0	0
3	Little Cormorant	*Phalacrocorax niger*	2500	1300	1386	318
4	Oriental Darter	*Anhinga melanogaster*	460	132	55	6
5	Little Egret	*Egretta garzetta*	1890	3200	1794	648
6	Western Reef-Egret	*Egretta gularis*	228	400	237	223
7	Grey Heron	*Ardea cinerea*	900	658	156	60
8	Purple Heron	*Ardea purpurea*	168	200	64	95
9	Great Egret	*Casmerodius albus*	2850	5000	1448	1742
10	Intermediate Egret	*Mesophoyx intermedia*	400	256	241	50
11	Cattle Egret	*Bubulcus ibis*	6000	4950	714	476
12	Indian Pond-Heron	*Ardeola grayii*	3980	5000	1119	746
13	Little Heron	*Butorides striatus*	500	500	72	108
14	Black-crowned Night-Heron	*Nycticorax nycticorax*	750	635	203	22
15	Yellow Bittern	*Ixobrychus sinensis*	86	150	18	14
16	Cinnamon Bittern	*Ixobrychus cinnamomeus*	127	150	7	2
17	Black Bittern	*Dupetor flavicollis*	29	50	1	3
18	Painted Stork	*Mycteria leucocephala*	2200	1485	285	6
19	Asian Openbill-Stork	*Anastomus oscitans*	3450	1980	1761	746
20	Black headed Ibis	*Threskiornis melanocephalus*	360	600	126	120
21	Lesser Whistling-Duck	*Dendrocygna javanica*	1950	5000	278	188
22	Lesser Whistling-Duck	*Dendrocygna bicolor*	16	200	0	2
23	Common Shelduck	*Tadorna tadorna*	0	0	1	0
24	Ruddy Shelduck	*Tadorna ferruuginea*	300	195	49	4
25	Eurasian Wigeon	*Anas penelope*	175	310	310	74
26	Spot-billed Duck	*Anas poecilorhyncha*	58	70	0	0
27	Gadwall	*Anas strepera*	120	150	6	22
28	Garganey	*Anas querquedula*	106	250	18	0
29	Northern Pintail	*Anas acuta*	620	1000	170	92
30	Cotton Teal	*Nettapus coromandelianus*	112	200	0	0
31	Common Teal	*Anas crecca*	42	100	0	0
32	Ruddy-breasted Crake	*Porzana fusca*	20	12	2	3
33	Brown Crake	*Amaurornis akool*	0	0	1	2
34	White-breasted Waterhen	*Amaurornis phoenicurus*	1000	682	94	26
35	Watercock	*Gallicrex cinerea*	6	20	0	3
36	Purple Moorhen	*Porphyrio porphyrio*	722	1000	74	34
37	Common Moorhen	*Gallinula chloropus*	620	1000	58	47
38	Common Coot	*Fulica atra*	270	500	0	130
39	Bronze-winged Jacana	*Metopidius indicus*	260	510	3	24
40	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	238	500	2	20
41	Pacific Golden-Plover	*Pluvialis fulva*	4700	2100	4670	1617

42	Grey Plover	*Pluvialis squatarola*	200	122	186	26
43	Little Ringed Plover	*Charadrius dubius*	300	265	124	86
44	Kentish Plover	*Charadrius alexandrinus*	1000	750	383	133
45	Lesser Sand Plover	*Charadrius mongolus*	4060	6000	4079	3280
46	Geater Sand Plover	*Charadrius leschenaultii*	0	0	1	0
47	Red-wattled Lapwing	*Vanellus indicus*	595	1000	132	60
48	Grey-headed Lapwing	*Vanellus cinerius*	30	18	9	8
49	Common Snipe	*Gallinago gallinago*	75	200	30	46
50	Black-tailed Godwit	*Limosa limosa*	3100	5000	1702	1502
51	Bar-tailed Godwit	*Limosa lapponica*	12	100	12	0
52	Whimbrel	*Numenius phaeopus*	1500	1042	257	266
53	Eurasian Curlew	*Numenius arquata*	242	300	65	138
54	Spotted Redshank	*Tringa erythropus*	260	125	0	0
55	Common Redshank	*Tringa totanus*	2830	5000	1418	3082
56	Marsh Sandpiper	*Tringa stagnatilis*	650	225	364	110
57	Common Greenshank	*Tringa nebularia*	174	200	70	34
58	Wood Sandpiper	*Tringa glareola*	700	400	508	192
59	Green Sandpiper	*Tringa ochropus*	18	70	0	0
60	Terek Sandpiper	*Xenus cinereus*	100	66	14	16
61	Common Sandpiper	*Actitis hypoleucos*	180	300	184	149
62	Ruddy Turnstone	*Arenaria interpres*	250	165	30	26
63	Little Stint	*Calidris minuta*	4550	8000	3772	1774
64	Temminck's Stint	*Calidris temminckii*	120	70	69	44
65	Curlew Sandpiper	*Calidris ferruginea*	6000	2810	2290	1684
66	Ruff Unidentified waders	*Philomachus pugnax*	200	5000	0 0	6 2040
67	Black-winged Stilt	*Himantopus himantopus*	2850	4000	1056	886
68	Pied Avocet	*Recurvirostra avosetta*	42	100	0	0
69	Small Pratincole	*Glareola lactea*	1500	2500	78	1220
70	Pallas's Gull	*Larus ichthyeatus*	120	150	38	88
71	Brown-headed Gull	*Larus brunnicephalus*	4000	2530	2483	2068
72	Black-headed Gull	*Larus ridibundus*	25	100	12	6
73	Whiskered Tern	*Chlidonias hybridus*	1610	2500	601	942
74	Gull-billed Tern	*Gelochelidon nilotica*	235	600	110	175
75	Caspian Tern	*Sterna caspia*	200	160	75	3
76	River Tern	*Sterna aurantia*	65	200	6	15
77	Large Crested Tern	*Sterna bergii*	32	250	0	12
78	Little Tern	*Sterna albifrons*	1310	1500	387	550
79	Common Tern	*Sterna hirundo*	250	455	0	0
75	Caspian Tern	*Sterna caspia*	200	160	75	3
76	River Tern	*Sterna aurantia*	65	200	6	15
77	Large Crested Tern	*Sterna bergii*	32	250	0	12
78	Little Tern	*Sterna albifrons*	1310	1500	387	550
79	Common Tern	*Sterna hirundo*	250	455	0	0
		Total	**78,118**	**88,564**	**35974**	**28376**

waterbird population was recorded from the mudflats emerged during the low-tide time in the Kakinada Bay, mud and sand flats and saltpans adjacent to the Coringa Wildlife Sanctuary during winter. The AWC were also conducted during 2013 & 2014 and over 28,300 to 36,000 waterbirds have been recorded (Annexure – 1) in the EGREE Region. This two year study and the AWC data during this study period proved that there is a substantial increase in the waterbird numbers in the EGREE Region.

The EGREE is an important area for the waders. Over 47 % of the waterbirds recorded in EGREE were waders (Figure 2). Waders are spotted at EGREE Region from August to May, with peaks in December and January. Among the waders, the Lesser Sand Plover *Charadrius mongolus*, Black-tailed godwit *Limosa limosa* Curlew sandpiper, *Calidris ferruginea, Pacific Golden-plover Pluvialis fulva* and Little stint, *Calidris minuta* were the commonest species and accounted for 72 to 83% of all waders observed at EGREE Region. Though the arrival of waders to the region was recorded from August, the main migratory influx of Palaearctic migrants occurred during November.

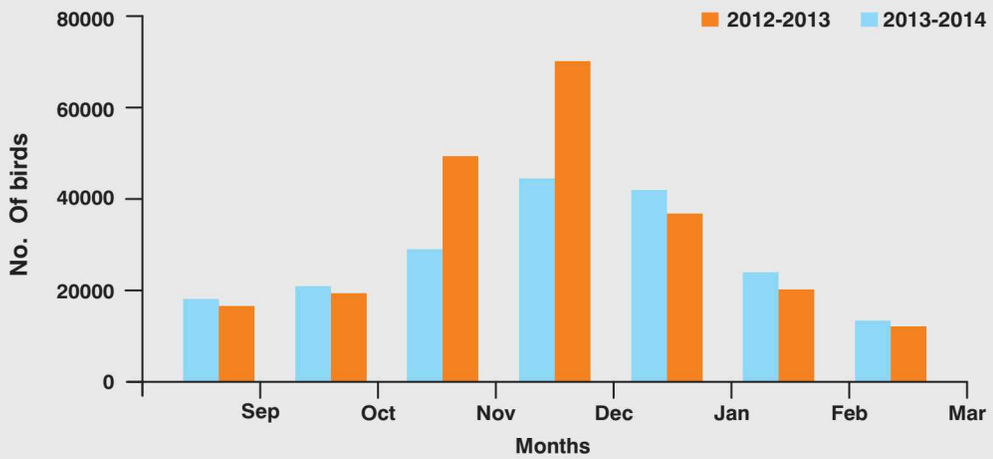

Figure 2 : *Population fluctuations of waterbirds in EGREE*

Of the 84 species of waders reported from India 51 species has been recorded in EGREE Region. Moreover, drastic decline in the population of the waders like Little stint, Curlew sandpiper and Lesser Sand plover has been reported by Balachandran (2006) in the major wintering areas along the east coast of India. During this two year study, it was observed that the mud and tidal flats in the region support more number of waders during the winter. The above three species were the most abundant species in the EGREE Region. Thus, it plays an important role for the fragile wader groups in the Central Asian Flyway (CAF). Waders mostly concentrate in areas of maximal food abundance (Goss Custard 1979, Bryant 1979, Puttick 1984). As per this study, the waders comprise about 47% of overall waterbird population in EGREE Region which indicates the healthy status and abundance of forage base. The migratory species utilize the region as refueling site during their onward and return migration as well.

A major threat perceived for the waterbirds in this region is the habitat loss. As the EGREE Region is one of the major economic hubs in the state, industrialization is under progress in fast pace. Filling of mud and sand flats around Kakinada, Corangi and Gadimogaare for industrial and aquaculture expansions are drastically undergoing. These mud-flats are extensively utilized by the waterbirds especially by waders during arrival and mid-winter periods. Some of the high-tide roosts sites adjoining to the Coringa Wildlife Sanctuary are also being converted for real estate business. Fishing disturbances in the tidal flats and the high-tide roosts of the waterbirds are the other threats, which impacts the energy expenditure of waterbirds during the departure time. Disturbances can be energetically costly due to lost feeding time and increased escape activities (Owen and Reinecke 1979). Disturbance during the non-breeding season may increase energy demands and/or delay migration (Fredrickson and Drobney 1979, Owen and Reinecke 1979), which result in decreased nutrient reserves, late arrival to breeding grounds, and ultimately, reduced reproductive success. Because, those individuals that do not attain migratory fat may have to stay at other sites to build it up or must over summer either at the study area or elsewhere in the north. Piersma and Baker (2000) explain that if birds arrive in a poor energetic state to the breeding area, they would have a very small chance of reproducing successfully. The EGREE Foundation is a cross sectoral platform established under the Government of India, United State Development Programme. It is funded by Global Environmental Facility to achieve the main streaming of the coastal and marine

biodiversity in to production sectors in this region. It is working on the possible habitat management measures with the supports of the corporate sectors to protect and conserve the waterbird congregation areas in the EGREE Region.

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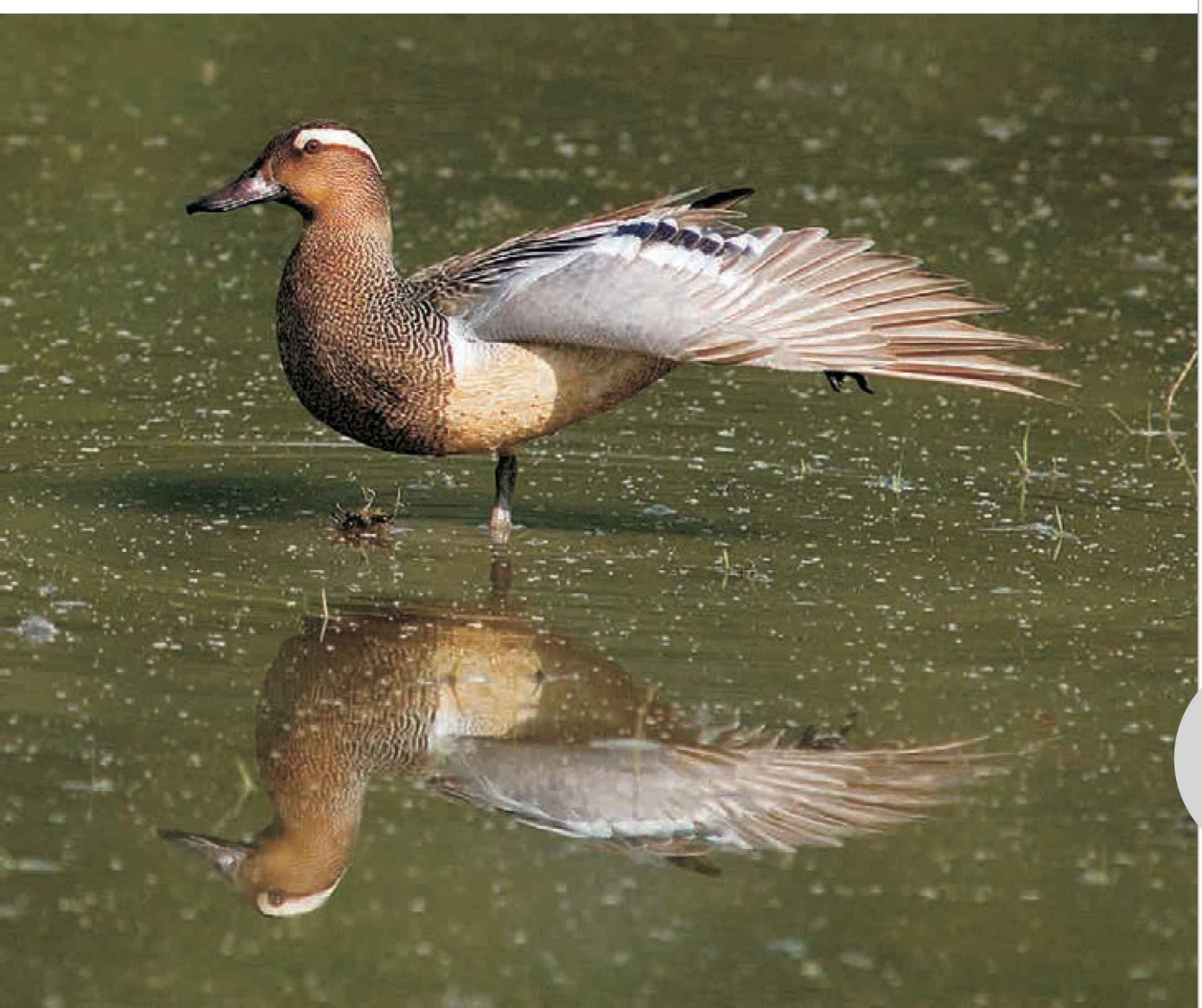

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