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Studies on migratory birds of Bannigola, Ankasamudra and Magadi Wetlands of North Karnataka, India

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Abstract
In the hitherto study both Bannigola backwaters and Ankasamudra lake recorded 47 species and 48 species of migratory birds respectively followed by Magadi lake with 32 species. Among them 49 species visited during winter, seasonal birds 8 species, 4 species of resident migrants, 2 species of summer visitor and one passage migrant (Greater flamingo) identified. Collectively from the three study areas 63 migratory species were recorded. Few of them are Northern Shoveler, Northern Pin tail, Bar headed geese, Black tailed godwit, Red headed buntings, wag tails, open gills, painted stork, ruddy shelduck, Demoiselle crane, etc. In North Karnataka these three study areas are considered as safe and potentials wetland habitats for migratory birds by providing abundant food as well as sufficient space for roosting and nesting activities.

Keywords: migratory birds, wetlands, habitat, North Karnataka

Introduction

Bird migration is a phenomenon which includes the regular and also seasonal movement of birds from one geographic location to another. It is common among large varieties of birds that have fascinated scientists and the public observers. Seasonal migration originated and influenced diversification in birds remains largely unknown. It is marked by the eventual return to the original place of starting and most evident among certain bird species that follow a regular annual cycle. Evolution of seasonal migration in birds has facilitated diversification through the divergence of migratory subpopulations and asymmetrical diversification as a mechanism by which diversification rates are decoupled from species richness (Rolland *et al.*, 2014) [19]. An estimated 1,855 bird species are migratory making regular cyclical movements from breeding grounds to feeding grounds and back with predictable timing and destinations across the globe (Kirby *et al*., 2008) [11]. *Migration is either regular or seasonal movement which made in response to changes in food availability, habitat and weather conditions. Migration is marked by the annual seasonality (Peter Berthold et al., 2001). Non-migratory birds are said to be resident or sedentary. Approximately 1800 of the world's 10,000 bird species are long-distance migrants (Sekercioglu, 2007; Rolland et al., 2014)* [20, 19].

It was demonstrated that the lentic aqua-systems or wetlands, were more fertile water bodies vital for migratory birds and other aquatic biota (Hosetti, 2002). The Ramsar Convention on wetlands advocated that conservation of wetlands as waterfowl habitats (Uttangi 2001) [25].

According to Bird Life International (2003), the wetlands of South Asia are facing tremendous anthropogenic pressure, which can greatly influence the structure of the bird community. The loss of wetlands either by the direct or indirect human activities has led to a decline in several water bird populations. Hence, it is an important factor to understand and abate the underlying causes in order to prevent the loss of key components of the biodiversity of wetland habitats (Tanmay Dutta, 2011). Inspite of all these anthropogenic pressures across the world, wetlands formed by the backwaters of T.B dam in North part of Karnataka attracting abundant avifauna from different parts of the world (Manohara and Hosetti, 2017) [16].

Migratory waterfowls are one of the most remarkable components of global biodiversity (Li and Mundkur, 2004) [15]. Water birds are not only the most prominent groups which attract people to wetlands, but also are good bio-indicators and useful models for studying a variety of environmental problems (Urfi *et al*., 2005) [24]. Out of 310 species of wetland birds found in India (Kumar *et al*., 2005) [12], almost half of them are migratory and visit India from their breeding grounds in China, Mongolia, Russia, Central Asia, Tibet and from across the entire range of the Himalaya (Kumar *et al*., 2005) [12]. Complex characteristics like water chemistry, aquatic vegetation, invertebrate fauna and physical features of wetlands and habitat structure are significantly influence birds species diversity (Gandiwa *et al*., 2013) [3].

Materials and Methods

Observation and photography of the wetland birds at the study area was done by using Olympus binoculars(Olympus 10X15 DPSI, Field 6.50) and (Cannon EoS 6001), DSLR camera. Birds were classified into orders and families by referring to “Birds of Indian Subcontinent” by R.Grimmett, Carol Inskipp and Tim Inskipp (2011) [23]. In the present study survey of birds conducted from April 2015 to March 2016, April 2016 to March 2017 and April 2017 to March 2018 for three consecutive years (weekly one visit to one study area and from 6AM to 11AM and 4PM to 6PM.

Study Area

Three areas were selected for the present studies and those are shown below (Fig.1).

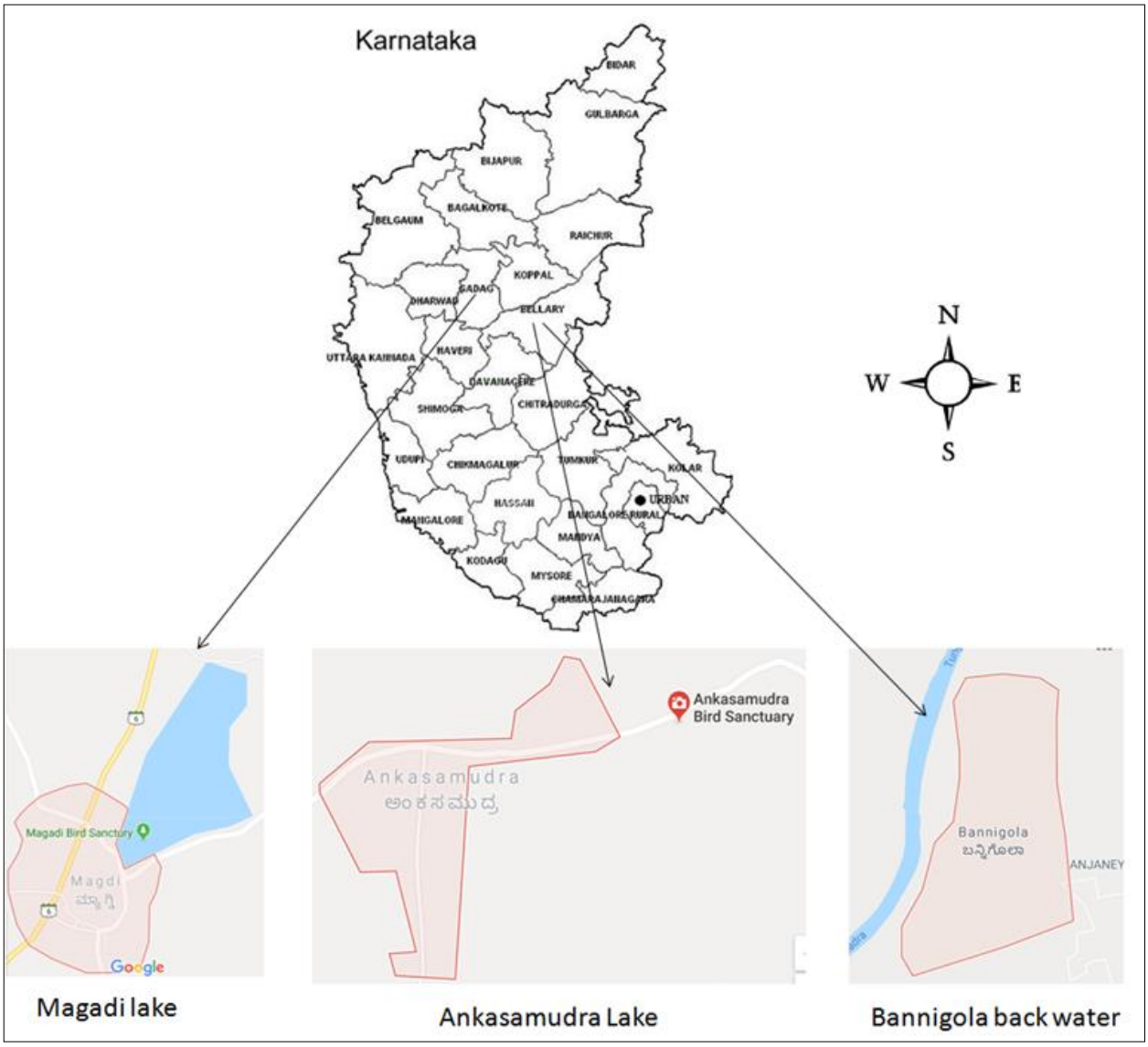

Fig 1: The three study areas *viz*, Magadi lake, Ankasamudra lake and Bannigola backwater.

Bannigola backwater of T.B. Dam

Bannigola is a Village in Hagaribommanahalli Taluk in Bellary District of Karnataka State, India. It is located 101 km towards west from District head quarters Bellary, 17 km from Hagaribammanahalli, 342 km from State capital Bangalore. It is located between 15º 10' 43.02 N latitude and 076 06' 23.3 E longitudes. Tunga Bhadra dam has been constructed across the river Tungabhadra near Hosapete, Bellary district and its water is spread in an area of 378 sq.km. during monsoon (T.B. Board, 2012). This impounded water formed number of wetlands in different parts. Among them Bannigola backwater region (where river is running) is the one has been selected for the study. This backwater wetland also provides water for fishing activities and irrigation to surrounding agricultural lands of Bannigola village.

Ankasamudra lake

Ankasamudra is a small village located in Hagaribommanahalli taluk, Bellary district, Karnataka, India, between 15º 7' 50.44" N and 76º 13' 52.83" E. Ankasamudra Lake is located outskirts of the village Ankasamudra and spreaded in 244 acres. This lake is located near to backwaters of T.B. dam and filled with both either natural rain water or by lifting backwater of T.B. dam. Since it is filled with water almost throughout the year and Acacia trees grown in the area attracted bird species during winter season. Hence, it is chosen for the study.

Magadi lake

It is a manmade lake that is built on the outskirts of Magadi village in Shirahatti taluk (8 kms from Shirahatti) of Gadag district (26 kms from Gadag), Karnataka, India between N 15.22 4378, E 75.51 3941. The tank spans about 134 acres of land area with a catchment of 900 hectares. The main water source is rain and surrounded by agricultural crop lands which are the food source for birds. It attracts many migratory birds from Asia and other foreign countries and from within country also. Hence, it is chosen for the study of diversity and abundance of avifauna in this region.

Results and discussion

The literature review revealed that since the past two decades, most of the wetlands of North Karnataka are being attracted by migratory birds and serving as stopovers to migrants and provided safe roosting, resting, feeding and breeding places to these guests. These attractions to migrants may be due to assured availability of food, vast

water spread area and also pleasant and pristine environment for their winter life.

In the hitherto study both Bannigola back water and Ankasamudra lake recorded 47 species and 48 species of migrants respectively followed by Magadi lake with 32 species. Among them, majority species are being arrived during winter season (49 Species), seasonal birds (8 species), resident migrant (4 Species), summer visitor (2 species) and passage migrant (1 species). A total of 63 migratory species recorded in the three study areas (Table.1).

Northern Shoveler (n=3770), Northern pintail (n=3700), Bar headed geese (n=2560), Black tailed Godwit (n=1928), Red headed Bunting (n=1850), Black headed bunting (n=1700), Barn Swallow (n=2120), Grey wagtail (n=1560), Yellow wagtail (n=1612) and passage migrant Greater flamingo (n=9810) were dominant in Bannigola back water. The total for three years it was 34386 individuals and the average worked out to be 11462 individuals. In the case of Ankasamudra lake registered 48 species, Rosy starlings with >48000 individuals highly dominated the lake. Asian Open Bill (n=21100), Northen Pin tail (n=600), Northen Shoveler (n=516), Painted stork (n-541), Red headed bunting (n=542), Black headed bunting (n=560), Grey wagtail (n=548), Yellow wagtail (n=424) are placed in next position. Apart from the above, the lake accommodated more than 28577 individuals (total of three years) with an average of 9511 individuals each year.

Another study area Magadi lake also recorded 32 species with 10,333 individuals (total of three years with 3444 individual per year). Bar headed geese occupied the first place with 9500 individuals (total of three years) and the average per year was (3166.67 individuals). It was followed by Demoiselle Crane (n=300) and Ruddyshell duck (n=103) (Table.1). In the current study it is also noticed that the main reason for this variations in population size is the availability of vast area for their housing and less disturbance. Since Bannigola back water area is having highly expanded water spread area of T.B Dam back water and open lands to accommodate highest number of migratory birds especially aquatic birds and waders but perchers move towards the places where trees exist after foraging for roosting or resting in the evening and nights.

Surprisingly, Ankasamudra lake also attracted more number of migratory birds though the area is comparatively small (244 acres) the main reason may be attributed to presence of well grown Acacia trees in the entire lake which provided place for roosting during night time along with availability of sufficient food (foraging grounds) available in both surrounding agricultural lands and in the vicinity of T.B Dam back waters.

Another interesting and noticeable information is though Magadi lake comparatively small (134 acres of land) attracted 32 species of migratory birds, but population size was confined to two digits, except Barheaded geese, Demoiselle Crane and Ruddy shell duck (Table.1). The main reason for which may be limited crowdy space to aquatic birds in the water body and open land for waders around the lake and trees for perchers for roosting purpose. Hence the population of migratory species is very much confined, though more number of migrants were recorded in the lake. It means the Magadi wetland is rich in diversity than density of species.

Dey (2015) stated that the relationship between habitat characteristics and community structure varied throughout the year and suggested that the birds respond variably to changes of habitat characteristics according to season. Wetlands which are structurally more heterogeneous attract winter migrants with high diversity and density and the availability of roosting, resting and feeding habitat are also very important to the migratory species (Abila, 2005; Manohara and Hosetti, 2017) [1, 16]. Anthropogenic and intense agriculture practices influenced characteristics of wetland. Status and ecological health of wetlands can be obtained by monitoring wetland and migratory birds (Millennium Ecosystem Assessment, 2005; Mwakubo et al., 2008; Manohara and Hosetti, 2018) [18, 17].

Table 1: Migratory Birds in all three study areas

Sl. No.	Common name	Origin of migration *	Status #	Bannigola		Ankasamudra		Magadi lake	
				Total of 3 years	Avg of 3 years	Total of 3 years	Avg of 3 years	Total of 3 years	Avg of 3 years
1	Montagu's Harrier	Europe	WV/Wm	18	6	10	3.3	4	1.33
2	Marsh harrier	Eurassia	WV/Wm	9	3	13	4.3	4	1.33
3	Pallied Harrier	Eurassia	WV	8	2.666667	×	×	×	×
4	Honey buzzard	Europe	SV	×	×	10	3.3	×	×
5	Tawny eagle	Asia	WM	×	×	6	2.0	×	×
6	Indian spot billed duck		R Seasonal	37	12.33333	310	103.3	26	8.67
7	Northern pintail	Europe, Asia,& N.America	M/WV	3700	1233.333	600	200.0	×	×
8	Northern shoveler	Europe, Asia& N.America	M/WV	3770	1256.667	516	172.0	14	4.67
9	Ruddy shelduck	SE Europe	WV	19	6.333333	123	41.0	103	34.33
10	Eurassian teal	Eurassia	M	32	10.66667	205	68.3	1	0.33
11	Garganey	Europe & W.Asia	M	181	60.33333	113	37.7	15	5.00
12	Lesser whistling duck	SE Asia	RM/WV	×	×	147	49.0	36	12.00
13	House swift	Japan, Nepal & SE Asia	M	×	×	110	36.7	×	×
14	Bar headed Geese	Mangolia	M/WV	2560	853.3333	×	×	9500	3166.67

15	Indian courser	South Asia	WV/Wm	×	×	6	2.0	×	×
16	Grey lag goose	Europe	M/WV	12	4	×	×	×	×
17	Eurassian wigeon	Eurassia	M	238	79.33333	×	×	×	×
18	Oriental pratincole	England & Australia	SV	340	113.3333	×	×	×	×
19	Brown headed gul	Asia	WM	285	95	×	×	10	3.33
20	Common snipe	Eurassia	WV	40	13.33333	291	97.0	1	0.33
21	Common sand piper	Australia & Africa	WM/WV	50	16.66667	93	31.0	12	4.00
22	Little stint	Eurassia	WM/WV	569	189.6667	43	14.3	2	0.67
23	Curlew sand piper	Siberia	WV	×	×	12	4.0	×	×
24	Common Red Shank	Eurassia	M	85	28.33333	46	15.3	×	×
25	Spotted Red Shank	N.Scandinavia	M	95	31.66667	×	×	×	×
26	Green Sand piper	Eurassia	RM	12	4	152	50.7	12	4.00
27	Marsh sand piper	Eurassia	M	×	×	46	15.3	12	4.00
28	Wood sand piper	Eurassia	M	22	7.333333	261	87.0	2	0.67
29	Pin tailed snipe	Russia	WV/Wm	×	×	148	49.3	□	□
30	Black tailed Godwit	Eurassia	M	1928	642.6667	105	35.0	2	0.67
31	Erasian curlew	Eurassia	M	35	11.66667	×	×	×	×
32	Yellow leged button quail	SE Asia	WV/Wm	×	×	8	2.7	×	×
33	Common Green shank	Eurassia & Scottland	WM	×	×	×	×	10	3.33
34	Wimbrel	Eurassia, N.America & Scottland	M	16	5.333333	×	×	×	×
35	Whiskered tern	Eurassia	WM/WV	97	32.33333	×	×	×	×
36	Painted stork	Asia(Tropical)	Seasonal	36	12	541	180.3	17	5.67
37	Asian open bill	SE Asia	Seasonal	262	87.33333	21100	7033.3	10	3.33
38	White stork	Europe, Afganisthan	WV/Wm	×	×	6	2.0	10	3.33
39	Ruff	Eurassia	Seasonal	×	×	200	66.7	×	×
40	Eurassian spoon bill	Eurasia	Seasonal	192	64	20	6.7	6	2.00
41	Blue -tailed bee eater	SE Asia	Seasonal	171	57	134	44.7	×	×
42	Jacobin cuckoo	Africa & Asia	M	16	5.333333	10	3.3	×	×
43	Demoiselle crane	Asia, Mongolia & China		×	×	×	×	300	100.00
44	Eurasian coot	Eurassia	WV/Wm	×	×	127	42.3	92	30.67
45	White throat warbler	Eurassia	WV/Wm	×	×	11	3.7	×	×
46	Common kestrel	Eurassia	WM	7	2.333333	0	0.0	7	2.33
47	Ashy Drongo	SE Asia	WV/Wm	125	41.66667	36	12.0	18	6.00
48	Rain quail	Nepal, Bangladesh, Myanmar, Pakistan	RM	31	10.33333	215	71.7	×	×
49	Blyth's Reed warbler	Eurasia	WV	18	6	×	×	65	21.67
50	Red headed bunting	Central Asia	WM	1850	616.6667	552	184.0	×	×
51	Black headed bunting	SE Europe	WM	1700	566.6667	560	172.0	×	×
52	Barn swallow	Eurassia	WM	2120	706.6667	170	56.7	×	×
53	White wagtail	Eurassia	WM	268	89.33333	72	24.0	4	1.33
54	Grey wagtail	Eurassia	WM	1560	520	548	182.7	4	1.33
55	Yellow wagtail	Europe	WM	1612	537.3333	424	141.3	4	1.33
56	Common stone chats	Siberia	WM	27	9	65	21.7	9	3.00

57	Black rock thrush	Europe, N.Africa, SE Asia	WV/RM	26	8.666667	×	×	×	×
58	Greenish warbler (Greenish leaf warbler)	Europe	WM	42	14	32	10.7	×	×
59	Chest nut tailed starling	SE Asia	WM	210	70	61	20.3	×	×
60	Spot billed pelecan	Asia	Seasonal	118	39.33333	194	64.7	×	×
61	Oriental Darter	SE Asia	Seasonal	27	9	12	4.0	×	×
62	Red rumped swallow	Eurassia	WV/Wm	×	×	113	37.7	×	×
63	Greater Flamingo	Africa, Europe	Passage Migrant/Seasonal	9810	3270	×	×	21	7.00
				34386	11462	28577	9511.0	10333	3444.3

The purpose of this study embodies initial analysis of a various species richness and distribution according to habitat in the three wetlands which provided data for the hitherto conservation program. Among these three study areas Magadi lake and Ankasamudra lake are facing relatively more threats by anthropogenic activities, where as Bannigola back waters of Tungabhadra (TB) dam facing minimum or less threats since it is located for away from human settlements.

The present practice of using wetlands for collecting wood, retting of fibres such as jute and coconut, indiscriminate discharge of factory effluent and sewage and using as a dumping place for all sorts of waste material needs to be stopped immediately, if we seriously want to conserve this precious natural heritage received by us through the farsightedness of our forefathers over millions of years. Similarly, reclamation of these areas for commercial purposes should be checked.

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