International Journal of Zoology Studies
ISSN: 2455-7269
Impact Factor: RJIF 5.14
www.zoologyjournals.com
Volume 3; Issue 2; March 2018; Page No. 255-260

Conservation of avifaunal diversity of two freshwater ponds of Rangenahalli area, Lakkavalli, Shimoga, Karnataka

Anusha GS, Shwetha Alavandi*, BB Hosetti
Department of Applied Zoology, Janasahyadri, Kuvempu University, Shimoga, Karnataka, India

Abstract
A study of bird fauna was conducted at Rangenahalli and Garike ponds during January 2017 to April 2017. The Rangenahalli pond is situated 35 km away from Shivamogga and 10 km from Shankaraghatta, approximately 5 acres. Garike pond is situated 1-2 km away from the university, approximately 1-2 acres. These ponds are used for the purpose of agriculture irrigation and drinking (domestic animals), and for inland fisheries. A total of 53 species of avifauna were recorded from 17 families and 29 families from Rangenahalli and Garike pond respectively, by direct count method using binoculars from both the ponds respectively. Out of 53 species, 10 species were migratory, 43 species resident birds. According to red data list in these birds 2 species are near threatened and other 51 species are least concerned. Avifaunal diversity was high in January and February as there was optimum water storage, availability of abundant food and increased vegetation. The minimum diversity was recorded in April due to non availability of food, human interference, loss of water etc. It is, therefore, pertinent that protection and conservation programmes for the hitherto wetlands should be given importance.

Keywords: avifaunal diversity, freshwater pond, Rangenahalli, garike

Introduction
The Indian subcontinent, a part of the vast Oriental biogeographic regions, is very rich in biodiversity. Out of the recorded 10,000 birds of the world, the Indian subcontinent alone contains around 1,500 species, or over 15% of the world's avifauna. Most birds drink water to make up for the loss and do so by dipping the bill and then tipping the head back to let the water run down into the throat to be swallowed. Many small birds use dewdrops as a source of water. Wetlands are the ecotones or transitional zones between permanently aquatic and dry terrestrial ecosystems. Wetlands are defined in different ways. The legal and jurisdictional definition was published in the book Engineers wetlands. Wetland constitutes a treasure of biodiversity. The social demand and dependence on the wetlands provide an unaccountable economic value to such habitats (Hosetti, 2002) [4].

The Rangenahalli pond is a perennial water body spread in 5 acres, and Garike pond is about 1 acre. Both provide good habitat for residential and migrating birds. Due to encroachment and other anthropogenic disturbances, the resident and local migratory birds are threatened. Water birds are the most prominent groups of vertebrate animals which attract urban people to wetlands and lakes. Also they are good ecological indicators and useful models for studying a variety of environmental problems (Rajashekara and Venkatesha, 2010) [7].

Birds use of wetlands during breading cycles ranges widely. Some birds depend on wetlands almost totally for breeding, nesting, feeding or shelter during their breeding cycles. Birds that need functional access to a wetlands or wetland products during their life cycle, especially during the breeding season, can be called "wetland dependent". Other birds use wetland only for their needs, or they might use both wetland and upland habitats. Many migratory birds are wetland dependent, using wetlands during their migration and breeding seasons (Utthangi *et al*., 2001) [8].

The geographic location of a wetland may determine how and when birds will use it or use adjacent habitat. Some wetlands are on the migration path of waterfowl and other migratory birds and provide stopover locations for travelling birds. These birds might feed in agricultural fields during the day return to the shelter of wetlands during the night.

Materials and methods
Study Sites
Two study sites were selected from the village namely, Rangenahalli. Whereas Garike pond is a man-made pond, as it spreads in small area and so complete pond is selected as a site. These ponds have vegetation of emergent and floating weeds, floating algal strands, sedges and grass. It has the connection source of inlet water from a channel of Bhadra river. Agricultural drainage and the sewage water from the village are added to this pond. The pond is polluted from the sewage entering from the village, which provided extra nutrients for the growth of aquatic vegetation. Many birds use this vegetation for nesting, resting and roosting. So that the flora and fauna can be maintained in such a way that, it is favorable to mainly avifauna. Otherwise if all the pond area is covered by emergent vegetation, due to succession it may be converted into swampy forest and may become suitable to only few species of birds.

Survey Methods

The water bird census was conducted at the pond between 7 am to 10 am. The number of these birds was counted by using binocular. Waterfowls were identified by referring the classical text book authorized by (Ali and Riply, 1983) [1]. Birds are enumerated for a wide variety of reasons. The available efforts for counting is usually limited may be adequate for students, accurate census are often very difficult to obtain. The key to good study lies in recognizing what kind of data are required and understanding the pits falls of the possible counting methods. But this need not prevent the extraction of useful data from a good quality.

i) Methods adapted for counting

Among the various methods explained above, only one method was used for counting and it was direct counting method. It was suitable for enumeration in the study.

ii) Direct counting (individual species)

For direct counting a suitable point is selected and all the visible birds are counted. The method is very useful when all the birds can be easily seen. With this method a high level of accuracy at a given time was obtained (Colin *et al.*, 1992) [2].

The pond was visited once in a month during which a bird census was carried out. The direct count was obtained with an attempt to cover all the birds in the study area. The birds are observed with binocular while walking on boundary of the pond. The study was carried out from January 2017 to May 2017.

Statistical analysis: Diversity calculation

- Shannnon's diversity value and Simpson's species richness value are calculated using PAST (Ver. 2.1).
- A diversity index is a mathematical measure of species diversity in a community. Diversity indices provide more information about community than simply species richness (Cox, 1967) [3].

Results and discussion

Monthly variation in the avifauna and the relative abundance of these species in the study area was recorded during the period from January 2017 to April 2017. The study revealed the occurrence of 53 species belonging to 32 families recorded from the study area.

The Table 1 revealed the details such as common and scientific names, status and frequency of the wetland birds recorded. Out of 53 species recorded, Cotton teal, Spot billed duck, Purple moorhen, Little egret, Median egret, Large egret, Cattle egret, Pond heron, Indian grey hornbill, Red watteled lapwing, Golden fronted chloropsis, Open billed stork, Brahmini kite, Ashy crowned lark, White throated kingfisher, Spotted dove, House crow, Asian koel, Crow pheasant, Black drongo, Rocket tailed drongo, Tickells flower pecker, Spotted munia, White throated munia, Bronze winged jacana, White headed babbler, Jungle babbler, Green bee eater, White browed wagtail, Purple rumped sunbird, Indian shag, Peafowl, Lesser flameback woodpecker, Baya weaver bird, Plum-headed parakeet, Red vented bulbul, Red whiskered bulbul, White breasted water hen, Common moorhen, Common myna, Black headed ibis were resident. Larger whistling teal, Lesser whistling teal, Garganey, Sand plover, Indian river turn, Yellow wagtail, Little cormorant, Great cormorant, Little grebe, Common coot, Purple moorhen were migratory birds.

Monthly variation in diversity of water birds and wetland dependent birds during the study period is represented in Fig 3 and 4. Most abundant families in Rangenahalli pond were represented in fig 5. It was observed that Anatidae and Ardeidae were more abundant followed by Rallidae, Phalacrocoracidae, Cuculidae. Fig 6 represents five most abundant families in Garike pond. Aradidae is the most abundant family followed by Charadriidae, Dicruridae, Estrildidae, Leiothrichidae families. Percentage composition of birds inhibiting in both study area during the period was represented in Graph 7. Interestingly it was observed the Rangenahalli pond was occupied by 65% of birds and Garike pond was occupied only 35%. It may be due to the less disturbance, higher water retention for a longer period, availability of abundant food and more vegetation in Rangenahalli pond compared to Garike pond.

The study on wetland birds of Rangenahalli and Garike ponds revealed a large number of birds belonging to different families. Though in India 26 wetlands are recognized internationally as Ramsar sites. But not a single site is designated from Karnataka. However the minor wetlands spread across the country. For example, Rangenahalli pond also functioning as stopover to the large number of migratory birds. During migration the migratory birds settle to the ground, feed on the resources, attain rest and continue their journey. Hence protection of small wetlands is important in the conservation measures offered to wetland avifauna. (Kumar *et al.* 2005) [6].

The major population of Common teal (larger whistling teal) is found in the study area and other more population of bird were Coot, Purple moorhen, Pond heron, Garganey, Cattle egret, Open billed stork found in all four months due to abundance of food source and safe habitat which was needed for these birds. Little Cormorants and Great Cormorants are migratory birds and Indian Shag is resident. Great cormorants are less common in number. These cormorants found moving to large trees in neighbouring woodlands for breeding activity with other birds. Purple moorhen was also found as migratory bird and common in the study area. Due to human activities and local displacement most of the time these are hidden by luxuries vegetation in the pond. The other species like Egrets, Pond Heron, Purple Heron, Bronze winged jacana, Open billed stork are resident and common species found in and around the pond depending upon the water conditions.

Small green bee eater birds were common in study area and more in number. Peafowls, Common myna, Ashy crowned lark, Jungle babbler, Red vented bulbul, Red whiskered bulbul, Spotted munia, House crow and plum-headed parakeet are also found. They were resident and commonly found in the study area. Monthly variation in diversity of water birds and wetland dependent birds during the study period is represented in Fig 3 and 4. It was observed that the avifaunal diversity was more in January and February as there was optimum water

storage, availability of abundant food and increased vegetation. The minimum diversity was recorded in April due to non availability of food, human interference, loss of water etc. and during this the birds might spread to neighboring ponds.

Most abundant families in Rangenahalli pond are represented in Fig 5. It was observed that Anatidae and Ardeidae are more abundant followed by Rallidae, Phalacrocoracidae, Cuculidae. Fig 6 represents five most abundant families in Garike pond. Aradidae is the most abundant family followed by Charadriidae, Dicruridae, Estrildidae, Leiothrichidae families. Percentage composition of birds inhibiting in both study area during the period was represented in Fig 7. Interestingly it was observed the Rangenahalli pond was occupied by 65% of birds and Garike pond was occupied by 35%. It may be due to the less disturbance, higher water retention for a longer period, availability of abundant food and more vegetation in Rangenahalli pond compared to Garike pond.

The threats to the birds are also important in the conservation of wetlands and their avifauna. In the present study the threats are encroachment, pollution, poaching and disturbance by road traffic. Specially the local fisherman caught the water birds and consumed. Our present study revealed that out of 53 species 10 species are migratory, 43 species resident birds. According to red data list in these birds 2 species are near threatened and other 51 species are least concerned (Kumar *et al.*, 2005) [6]. In Rangenahalli pond Shannnon's diversity value is found to be 2.976 and Simpson's species richness value 0.9297 and in Garike pond Shannnon's diversity value is 3.335 and Simpson's species richness value 0.9562.

Rangenahalli pond is spread in an area of 5 acres some part of the land is encroached by the locals and other side it is bordered by highway which created traffic noise around the clock. It is found that the birds are immune to traffic noise and they deterred away when we visited the pond. But the road is on a elevation and it is easy to witness the birds and enumerate them. The pond is polluted from the sewage entering from the neighboring village, which provided extra nutrients for the growth of aquatic vegetation. Many birds use this vegetation for nesting, resting and roosting. However, our study revealed that there is a need to partial removal of emergent vegetation every year. So that the flora and fauna can be maintained in such a way that, it is favourable to mainly avifauna. Otherwise if all the pond area is covered by emergent vegetation, due to succession it may be converted into swampy forest and may become suitable to only few species of birds. Lack of open water may deter the wading birds like Ducks, ultimately affecting the total biodiversity of avifauna (Ishwar Bhatt *et al.*, 2009) [5].

The study proved that the changes in ecological characteristics of the pond greatly affect avifauna. Siltation, pollution, poaching, disturbance by road traffic and weed infestation are the major threats to avifauna of both study areas. Hence it is required to restore the original ecological features of Rangenahalli pond by the local government.

The study documents the rich avifauna diversity showing the area still provides some potential habitats for the wetland dependent birds. Therefore, it is the need of the hour to monitor these areas systematically in the rapidly changing environment with a focused study on status and distribution of the avifauna of the region. This can be achieved only through strengthening public participation in the study of status, distribution and frequency of the birds in the study area. The study could effectively provide the baseline data for research, which could be used for conservation purpose of avifaunal diversity. These ponds also serve as an important stopover to migratory bird species. In view of ecological importance both study areas should be protected, conserved as an important bird areas.

Study sites

Fig 1: A view of Rangenahalli pond

Fig 2: A view of Garike pond

Table 1: Checklist of wetland birds of Rangenahalli and Garike ponds.

Sl.no.	Common name	Scientific name	Status	IUCN Status	Frequency	Rangenahalli		Garike pond
						Site 1	Site 2	
Accipitridae								
01	Brahminy kite	*Haliastur indus*	R	L C	common	✓	-	✓
Alaudidae								
02	Ashy crownwd lark	*Eremopterix griseus*	R	L C	Common	-	-	✓
Alcedinidae								
03	White throted kingfisher	*Halcyon sumyrnensis*	R	L C	common	-	-	✓
Anatidae								
04	Cotton teel	*Nettapus coromandelianus*	R	L C	Common	✓	-	-
05	Larger wistling teal(Common teal)	*Anas crecca*	M	L C	Common	✓	-	-
06	Lesser wistling teal	*Dendrocygna javanica*	M	L C	Common	✓	-	-
07	Spot billed duck	*Anas poecilorhyncha*	R	L C	Common	✓	-	✓
08	Garganey	*Anas querquedula*	M	L C	Common	✓	-	-
Apodidae								
09	Asian palm swift	*Cypsiurus balasiensis*	R	L C	Common	-	-	✓
Ardeidae								
10	Cattle egret	*Bubulcus ibis coromandus*	R	L C	Common	-	✓	✓
11	Large egret	*Casmerodius alba*	R	L C	Common	✓	✓	✓
12	Little egret	*Egretta garzetta*	R	L C	Common	✓	✓	✓
13	Median egret	*Egretta intermedia*	R	L C	Common	✓	✓	✓
14	Pond heron	*Ardeola grayii*	R	L C	Common	✓	✓	✓
15	Purple heron	*Ardea purpurea*	R	L C	Common	-	-	✓
Bucerotidae								
16	Indian grey hornbill	*Ocyceros birostris*	R	L C	Common	-	-	✓
Charadriidae								
17	Red watteled lapwing	*Vanellus indicus*	R	L C	Common	✓	-	✓
18	Sand plover	*Charadrius mongolus*	M	L C	Common	-	-	✓
Chloropsidae								
19	Golden fronted Chloropsis	*Chloropsis aurifrons*	R	L C	Common	-	-	✓
Ciconiidae								
20	Open billed stork	*Anastomus oscitans*	R	L C	Common	-	✓	-
Columbidae								
21	Spotted dove	*Stereptopelia chinensis*	R	L C	Common	-	-	✓
Corvidae								
22	House crow	*Corvus splendens*	R	L C	Common	✓	✓	✓
Cuculidae								
23	Asian koel	*Euelynamys scolopacea*	R	L C	Common	✓	-	✓
24	Crow pheasant	*Centropus sinensis*	R	L C	common	-	✓	✓
Dicaeidae								
25	Tickells flowerpecker	*Dicaeum erythrorhynchos*	R	L C	Common	-	-	✓
Dicruridae								
26	Black drongo	*Dicrurus macrocercus*	R	L C	Common	-	✓	✓
27	Rocket tailed drongo	*Dicrurus paradiseus*	R	L C	Uncommon	-	-	✓
Estrildidae								
28	Spotted munia	*Lonchura punctulata*	R	L C	Common	-	-	✓
29	White throated munia	*Lonchura striata*	R	L C	common	-	-	✓
Jacanidae								
30	Bronz winged jacana	*Metopidius indicus*	R	L C	Common	✓	-	-
Laridae								
31	Indian river tern	*Sterna aurantia*	M	N T	Common	✓	-	✓
Leiothrichidae								
32	White headed babbler	*Turdoides affinis*	R	L C	Uncommon	-	-	✓
33	Jungle babbler	*Turdoides striata*	R	L C	Common	-	-	✓
Meropidae								
34	Green bee eater	*Merops orientalis*	R	L C	Common	-	-	✓
Motacillidae								
35	White browed wagtail	*Motacilla madaraspatensis*	R	L C	Common	-	-	✓
36	Yellow wagtail	*Motacilla flava*	M	L C	Uncommon	✓	✓	✓
Nectarinicidae								
37	Purple rumped sunbird	*Nectarinia zeylonica*	R	L C	Common	-	-	✓

Sl.no.	Common name	Scientific name	Status	IUCN Status	Frequency	Rangenahalli		Garike pond
						Site 1	Site 2	
Phalacrocoracidae								
38	Little carmorant	*Phalacrocorax niger*	M	L C	Common	✓	-	✓
39	Indian shag	*Phalacrocorax fuscicillis*	R	L C	Common	✓	-	-
40	Great carmorant	*Phalacrocorax carbo*	M	L C	Uncommon	✓	-	-
Phasianidae								
41	Pea fowl	*Pavo cristatus*	R	L C	Uncommon	-	-	✓
Picidae								
42	Lesser flameback woodpecker	*Dinopium benghalense*	R	L C	Common	-	-	✓
Ploceidae								
43	Baya weaver bird	*Ploceus philippinus*	R	L C	Common	✓	✓	✓
Podicipedidae								
44	Little greeb	*Tachybaptus ruficollis*	M	L C	common	✓	-	✓
Psittacidae								
45	Plum-headed parakeet	*Psittacula cyanocephala*	R	L C	common	-	-	✓
Pycnonotidae								
46	Red vented bulbul	*Pycnonotus cafer*	R	L C	Common	-	-	✓
47	Red wiskered bulbul	*Pycnonotus jocosus*	R	L C	common	-	✓	✓
Rallidae								
48	Common coot	*Fulica atra*	M	L C	Common	✓	-	-
49	Purple moorhen	*Porphyrio porphyrio*	M	L C	Uncommon	✓	-	✓
50	White brested waterhen	*Amaurornis phoenicurus*	R	L C	Common	✓	-	✓
51	Common moorhen	*Gallinula chloropus*	R	L C	Common	✓	-	-
Sturnidae								
52	Common myna	*Acridotheres tristis*	R	L C	Common	-	-	✓
Threskiornithidae								
53	Black headed ib	*Threskiornis melanoceohalis*	R	N T	Uncommon	-	✓	-

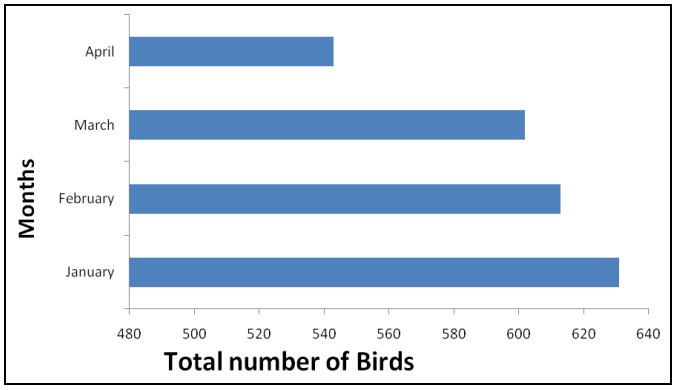

Fig 3: Month-wise Population Abundance of birds at Rangenahalli pond

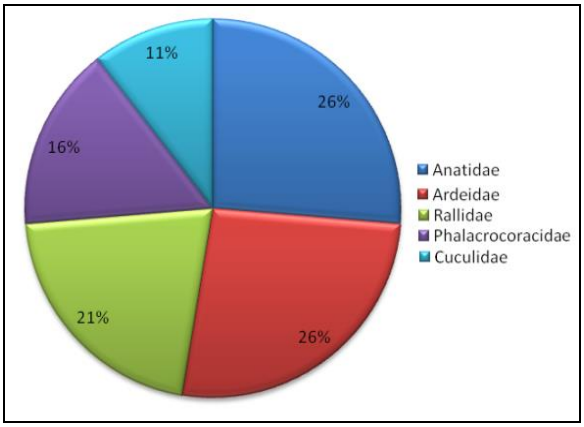

Fig 5: Most abundant families in Rangenahalli pond

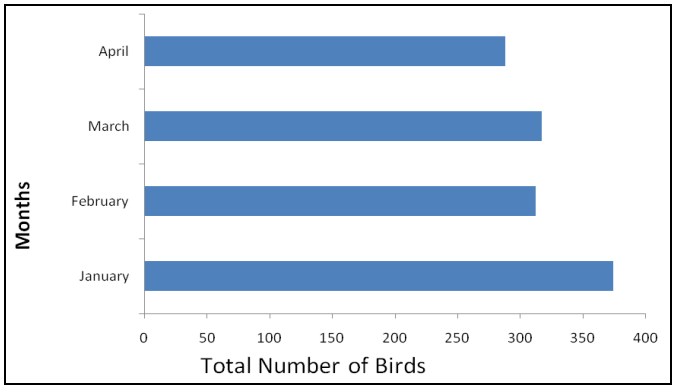

Fig 4: Month-wise population abundance of birds at Garike pond

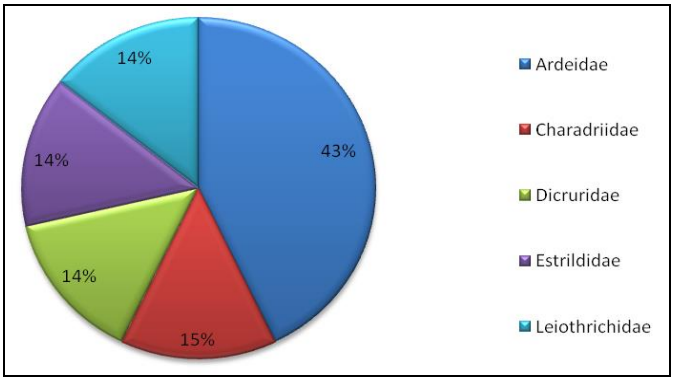

Fig 6: Most abundant families in Garike pond

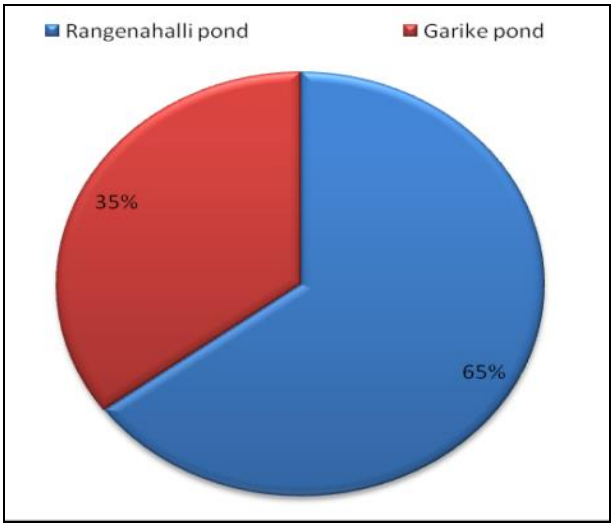

Fig 7: Percentage composition of avifauna in Rangenahalli pond and Garike pond

References

1. Ali S, Ripley SD. Hand Book of Birds of India and Pakistan. Oxford university press, Delhi. 1983.
2. Colin JB, Neil DB, David AH. Bird Census Techniques. Academic Press Ltd., London. 1992.
3. Cox GW. Laboratory Manual of General Ecology. WCB Company Publishers, Dubuque, Iowa, 1967; 165-167.
4. Hosetti BB. Wetlands Conservation and Management. Pointer Publishers, Jaipur, India. 2002.
5. Ishwara Bhat P, Samuel CS, Hosetti BB. Avifauna diversity of Anekere wetland, Karkala, Udupi district, Karnataka, India. Journal of Environmental Biology. 2009: 30(6):1059-1062.
6. Kumar A, Sati JP, Tak PC, Alfred JRB. Handbook on Indian Wetland Birds and their Conservation. 2005. i-xxvi; 1- 468 (Published by the Director, Zool. Surv. India).
7. Rajashekara S, MG Venkatesha. Community composition of aquatic birds in lakes of Bangalore, India**.** Journal of Environmental Biology. 2011: 32(1):77-83.
8. Uttangi JC. Conservation and management for the waterfowls of minor irrigation tanks and their importance as stopover sites in Dharwad district. In: Trends in Wildlife Biodiversity Conservation and Management**.** (Eds. B.B. Hosetti and M. Vekateshwarlu), 2001: I, Daya Publishing House, Delhi.