Lake 2016: Conference on Conservation and Sustainable Management of Ecologically Sensitive Regions in Western Ghats [THE 10TH BIENNIAL LAKE CONFERENCE]
Date: 28-30th December 2016, http://ces.iisc.ernet.in/energy
Venue: V.S. Acharya Auditorium, **Alva's Education Foundation**, Sundari Ananda Alva Campus, Vidyagiri, Moodbidri, D.K. Dist., Karnataka, India – 574227

Status of Bird Diversity at Yediyur Lake and Arekere Lake in Bengaluru City

Vrijulal MV
#15, 1st Floor, 2nd Cross, JP Nagar 2nd Phase, Bengaluru
E-mail: vriju4988@gmail.com
Mobile: +91 8050537477

***Abstract*– Rapid urbanisation and increasing urban population has led to the shrinking of natural habitats and its components in Bengaluru city. Avifauna being one of the prime bio indicators, are disappearing from the urban environment which is a serious environmental concern. During the study it was observed that the diversity of birds are higher around the water bodies when compared to parks or other commercial areas as these lakes provide them food and water. This reflects the need for conserving the shrinking lakes and also improving the condition of degraded lakes in a sustainable manner that can support many life systems. The present work is a comparative study of bird diversity at two lakes to assess the effectiveness of the present lake development methods and if there is a further scope to improve the habitat for birds.**

INTRODUCTION

Birds are one of the bio indicators of a healthy environment, as they have different dietary requirements, placing them in different trophic levels.They are a useful taxonomic group to monitor as they are often well known, easily recognisable, simpler to locate than many other groups, can be valuable indicators of the state of particular habitats (Bibby et al., 2000). They can indicate changes in: vegetation extent, pattern and structure (Finch, 1991). Due to this, birds react to any disturbance that is caused to an environment in different ways. The most basic necessity for them is the presence of food source and habitats suitable for their nesting. Observing the type of birds in a location can indicate the presence of its food, for example; presence of insectivorous birds in a location clearly indicates the abundance of insects present in that region. Another important aspect to choose birds as bio indicators for this study is that it is possible to detect environmental changes which cannot be observed or predicted by measuring a limited set of pre-selected physical or chemical parameters (Koskimies, Pertti, 1989).

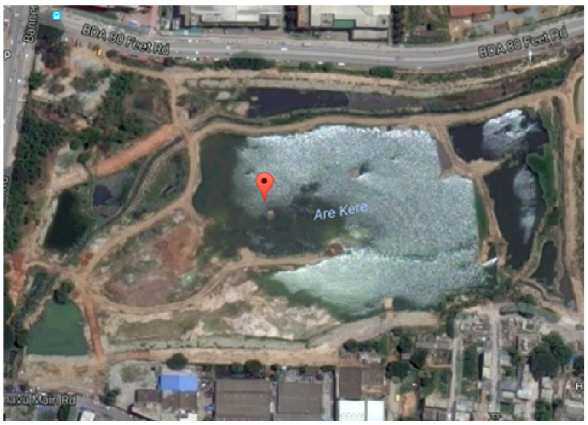
Bengaluru once known as the 'Garden City' is losing its 'Green' cover at a very quick rate ever since it was named as the 'Silicon Valley'. Several lakes across the city have been converted into bus stands, residential areas, business parks, playgrounds etc. It is understood that these wetlands are highly productive, support exceptionally large biological diversity, and provide a wide range of ecosystem services such as food, fibre, waste assimilation, water purification, flood mitigation, erosion control, groundwater recharge, microclimate regulation, enhance the aesthetics of the landscape, and support many significant recreational, social and cultural activities, aside from being a part of our cultural heritage.It was acknowledged that most urban wetlands are seriously threatened by conversion to non-wetland purposes, encroachment of drainage through landfilling, pollution (discharge of domestic and industrial effluents, disposal of solid wastes), hydrological alterations (water withdrawal and inflow changes), and over-exploitation of their natural resources (Ramachandra &Bharath, 2015).

As birds appear at different trophic levels, feeding from plants and trees, fish and aquatic insects, ground dwelling insects, aerial insects, amphibians, reptiles, rodents and other birds, clearly indicates the richness of flora and fauna of any given habitat. They are considered useful biological indicators because they are ecologically versatile and live in all kinds of habitats as herbivores, carnivores and omnivores (Koskimies, Pertti, 1989). In this study, bird diversity at two lakes that belong to Koramangala – Challaghatta Valley is studied in order to compare and analyse the scope for developing the lakes in a scientific and sustainable manner with birds as bio indicators.

STUDY AREA:

Study Area 1 :Yediyur Lake (Source: Google Earth)

Yediyur Lake (12°56'1"N and 77°34'35"E) is located in Jayanagar area at the southern part of Bengaluru with an area of about 10 acres.This lake is surrounded by residents and busy roads with lot of human activity around. The banks of this lake are covered with stones laid by the authorities. De-weeding is done regularly. Aquaculture and boating are observed. Garbage from some residents is disposed at some areas on the stone laid shores and sides of the lake. There is a well maintained park with several tall trees forming dense canopy and proper concrete pathway for people to walk. Music is played during morning and evening walking hours. Two sewage inlets observed. Fencing is intact with creepers and bushes growing along. This lake is considered as moderately polluted lake that has low ionic as well as nutrient contents but supports algal and macrophyte growth (Ramachandra TVet al., 2015)



Study Area 2 :Arekere Lake (Source: Google Earth)

Arekere Lake (12°52'59"N and 77°35'55"E) is located in the Arekere and Hulimavu area at the southern part of Bengaluru with an area of about 25 acres. This lake is surrounded by extremely busy roads filled with smoke and dust and two sides of the lake have small human settlements. Naturally grown trees on one side, rest of the area are covered with various grass, shrubs and weeds. There are few water settlement areas near the sewage inlets. Garbage from nearby residents is dumped on all sides of the lake. Meat shops nearby dump their wastes at the lake shore. Open defecation seen on all the sides of the lake. Fencing work is not intact. People are seen taking bath, bathing cattle, washing clothes and vehicles. This lake is considered as highly polluted that has high ionic contents, rich in nutrients and has high oxygen demand due to high organic contents (Ramachandra TV et al., 2015)

MATERIALS AND METHOD:

- Binoculars and DSLR Camera (Nikon D3200 with Nikor 70-300mm Lens)
- Field guides used to assist in identification.
- Two visits to each lake in a month were made during the morning and evening hours with 3 hours per visit..
- Random Sampling method was followed.

RESULTS AND DISCUSSION:

The study was conducted from June 2016 to November 2016. Below are the detailed findings from the study

June-November 2016

Lake Name	No Of Bird Species Spotted
Yediyur Lake	35
Arekere Lake	34

Checklist of Birds Spotted at the Yediyur Lake

SL No	Common Name	Scientific Name
1	Ashy Prinia	*Priniasocialis*
2	Asian Koel	*Eudynamysscolopaceus*
3	Barn Swallow	*Hirundorustica*
4	Black Capped Night Heron	*Nycticoraxnycticorax*
5	Black Kite	*Milvusmigrans*
6	Blue Rock Pigeon	*Columba livia*
7	Blyth's Reed Warbler	*Acrocephalusdumetorum*
8	Brahminy Kite	*Haliasturindus*
9	Cattle Egret	*Bubulcus ibis*
10	Common Kingfisher	*Alcedoatthis*
11	Common Myna	*Acridotherestristis*
12	Coppersmith Barbet	*Megalaimahaemacephala*
13	Great Tit	*Parus major*
14	Greater Cormorant	*Phalacrocoraxcarbo*
15	Greater Coucal	*Centropussinensis*
16	House Crow	*Corvussplendens*
17	House Sparrow	*Passer domesticus*
18	Indian Pond Heron	*Ardeolagrayii*
19	Jungle Crow	*Corvusmacrorhynchos*
20	Jungle Myna	*Acridotheresfuscus*
21	Little Cormorant	*Microcarbo niger*
22	Little Egret	*Egrettagarzetta*
23	Pale Billed Flowerpecker	*Dicaeumerythrorhynchos*
24	Plain Prinia	*Priniainornata*
25	Purple Rumped Sunbird	*Leptocomazeylonica*
26	Purple Sunbird	*Cinnyrisasiaticus*
27	Red Vented Bulbul	*Pycnonotuscafer*
28	Red Whiskered Bulbul	*Pycnonotusjocosus*
29	Rose Ringed Parakeet	*Psittaculakrameri*
30	Spot Billed Duck	*Anaspoecilorhyncha*
31	Spot Billed Pelican	*Pelecanusphilippensis*
32	Spotted Dove	*Spilopeliachinensis*
33	White Browed Wagtail	*Motacillamaderaspatensis*
34	White Cheeked Barbet	*Megalaimaviridis*
35	White Throated Kingfisher	*Halcyon smyrnensis*

Checklist of Birds Spotted at the Arekere Lake

SL No	Common Name	Scientific Name
1	Ashy Prinia	*Priniasocialis*
2	Asian Koel	*Eudynamysscolopaceus*
3	Barn Swallow	*Hirundorustica*
4	Black Kite	*Milvusmigrans*
5	Blue Rock Pigeon	*Columba livia*
6	Blyth's Reed Warbler	*Acrocephalusdumetorum*
7	Brahminey Kite	*Haliasturindus*
8	Cattle Egret	*Bubulcus ibis*
9	Common Coot	*Fulicaatra*
10	Common Myna	*Acridotherestristis*
11	Common Sandpiper	*Actitishypoleucos*
12	Greater Cormorant	*Phalacrocoraxcarbo*
13	Greater Coucal	*Centropussinensis*
14	Grey Wagtail	*Motacillacinerea*
15	Indian Pond Heron	*Ardeolagrayii*
16	Jungle Crow	*Corvusmacrorhynchos*
17	Jungle Myna	*Acridotheresfuscus*
18	Little Cormorant	*Microcarbo niger*
19	Little Grebe	*Tachybaptusruficollis*
20	Little Egret	*Egrettagarzetta*
21	Oriental Magpie Robin	*Copsychussaularis*
22	Pale Billed Flowerpecker	*Dicaeumerythrorhynchos*
23	Pied Bushchat	*Saxicolacaprata*
24	Purple Heron	*Ardeapurpurea*
25	Purple Swamphen	*Porphyrio porphyria*
26	Red Wattled Lapwing	*Vanellusindicus*
27	Rose Ringed Parakeet	*Psittaculakrameri*
28	Shikra	*Accipiter badius*
29	Spotted Dove	*Spilopeliachinensis*
30	Wire Tailed Swallow	*Hirundosmithii*
31	White Breasted Waterhen	*Amaurornisphoenicurus*
32	White Browed Wagtail	*Motacillamaderaspatensis*
33	White Cheeked Barbet	*Megalaimaviridis*
34	White Throated Kingfisher	*Halcyon smyrnensis*

Percentage wise segregation of Bird Species based on Food Habits

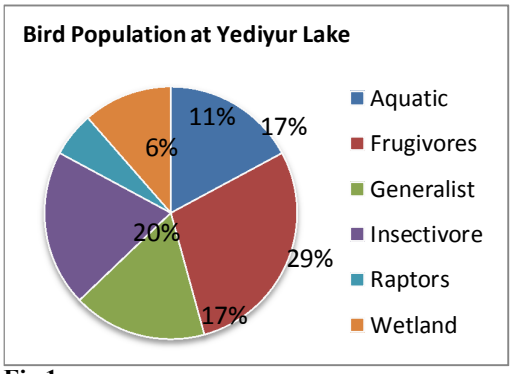


Fig 1

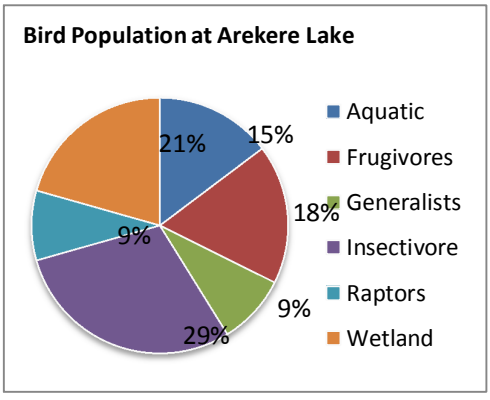


Fig 2:

Yediyur Lake

As seen in Fig 1, the frugivorous bird species were the highest at 29%. This clearly indicates the presence of many fruiting and flowering plants. The improvement of the park around the lake has led to planting of several fruiting and flowering species of plants which has drawn the high concentration of birds that are frugivorous in nature. The park also has bushes near the fences and play area that support many insects;hence 20% of bird species found at this lake are insectivorous. The generalists and aquatic birds were each present at 17%. Even though the percentage is slightly low in terms of species, the population of aquatic birds like Little Cormorants, Greater Cormorants and Spot Billed Ducks; generalists like House Crow, Jungle Crow, Common Mynas and Jungle Mynas were in decent numbers. Wetland birds were only at 11% with concentration of Black Capped Night Heron and Little Egrets. Few Cattle Egrets and Indian Pond Herons were present. The constant removal of aquatic weeds has led to few species like Purple Swamphen, White Breasted Waterhen, Bronze Winged Jacana, Common Sandpiper etc. being absent. The only raptorial birds found were Black Kite and Brahminy Kite that forms the 6%. These birds are commonly seen throughout the city.

Arekere Lake

As seen in Fig 2, the insectivorous species of birds are highest at 29%. Majority of the lake's shores are covered with bushes and shrubs and lack of concreting has sustained much number of insects, reptiles and rodents. This high density of prey is able to sustain a varied diversity of bird species. Some ground nesting species like Red Wattled Lapwing, White Browed Wagtail were found with Juveniles. 21% consisted of wetland species. Fragmented areas with dense aquatic weeds are able to support a decent number of wetland species.

Frugivorous and aquatic birds were found at 18% and 15% respectively. Naturally grown trees and plants bearing fruits and flowers support the frugivores. Large body of water with aquatic insects, weeds and fishes are able to support the aquatic bird diversity. Common Coot and Little Grebe were seen with chicks. Generalists and raptors were found at 9% each. Small number of Jungle Crows, Jungle Myna and Common Mynas were found only in the outskirts of the lake. Apart from the commonly seen Black Kite and Brahminy Kite, a pair of Shikra was seen on every visit.

CONCLUSION:

During the study period of June-November 2016, both Yediyur Lake and Arekere Lake showed similar count for the number of species at 35 and 34 respectively. Yediyur Lake has shown concentration of species from only two trophic levels and very few species in other areas, whereas Arekere Lake shows birds from different trophic levels in decent numbers. This clearly shows that the development needs to be planned in such a way that supports different habitats around the lake. Planting of only fruit and flower bearing trees might look beautiful to human eyes but might not serve the natural inhabitants of the lake.

RECOMMENDATIONS:

Lake Development should be planned in a sustainable manner by having a mixed variety of habitats that can provide source of food, shelter and conditions suitable for nesting for various species. Portions of grassland, shrubs, mixed vegetation of fruit bearing and flowering plants, host plants for several insects etc should be given prominence instead of exotic species used for decoration. Walking path for morning and evening walkers can be made as the birds seems to get used to people walking over the time as observed at Yediyur Lake. Strict measures should be taken to avoid garbage disposal. The shores of the lake should not be concreted. Yediyur Lake can attract more birds if a small portion can be left with aquatic weeds. Concrete should be removed completely from the shores or from portions where possible to create grassland or scrubland so that ground nesting birds can make use of the space. Garbage disposal at certain areas to be stopped.

Arekere Lake receives a large amount of garbage from nearby residents, meat shops etc, which needs to be stopped. Open defecation should be prohibited and checked. A proper path can be maintained for morning and evening walkers which can also help in controlling open defecation and garbage disposal. Planting of selected fruiting and flowering plants can be carried out. Amount of sewage entering the lake to be checked. Keeping a check on overgrowth of aquatic weeds. Prohibit entry of vehicles inside the lake premises to avoid damage to any nests or any organisms on the ground. Fencing of lake to avoid further encroachment. If these are not taken care of, bird species that cannot find the suitable conditions will migrate out of the city permanently without any resourceful patches in the urban environment. This is a matter of concern that should be given prominence as birds are one of the bio indicators of a healthy environment.

ACKNOWLEDGEMENTS:

I acknowledge, with gratitude, my debt of thanks to Prof. TV Ramachandra for providing this wonderful opportunity and Harish R Bhat for his advice and encouragement.

REFERENCES:

1) Carol Inskipp, Richard Grimmett, Tim Inskipp(2011). Birds of the Indian Subcontinent. Oxford University Press.

2) Harish R Bhat, PramodSubbarao (2006).PakshiPrapancha, AsimaPratishtana Publication.

3) T.V. Ramachandra and Bharath H. Aithal(2015). Wetlands: Kidneys of Bangalore's Landscape, National wetlands, 37:12-16.

4) Bibby CJ, Burgess ND, Hill DA and Mustoe SH (2000). Bird Census Techniques, 2nd Edition. Academic Press, London.

5) Finch, Deborah M. 1991. Positive associations among riparian bird species correspond to elevational changes in plant communities. Canadian Journal of Zoology. 69: 951-963.

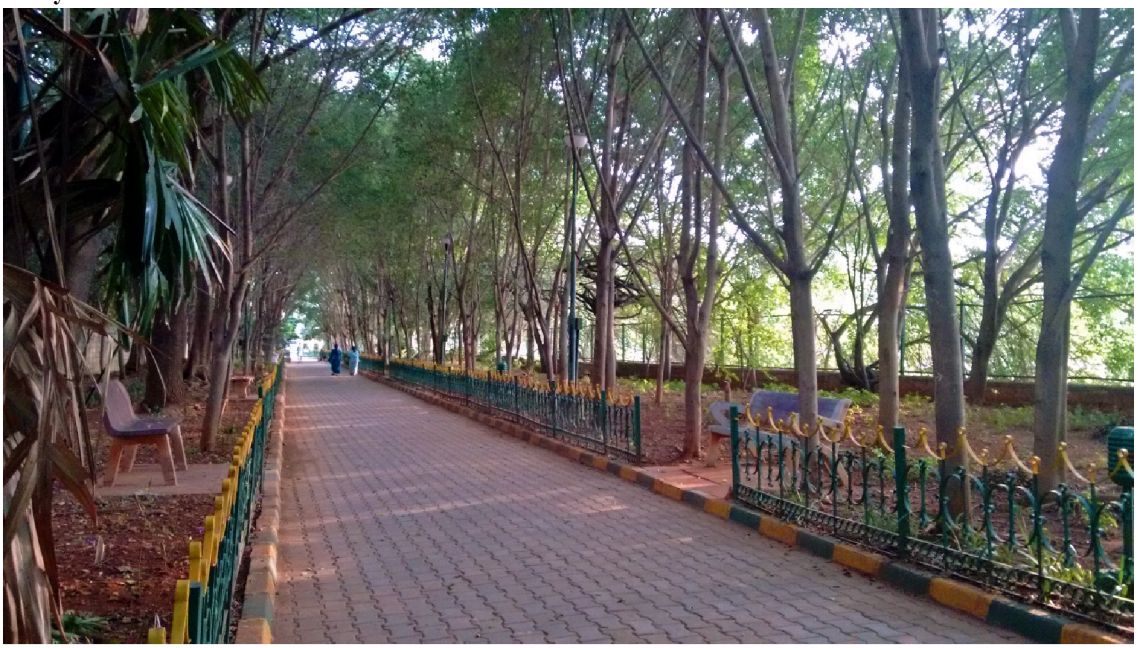
6) Nilsson, Sven G., and Ingvar N. Nilsson., 1978. "Breeding Bird Community Densities and Species Richness in Lakes." Oikos, 31: 214.

7) Koskimies, Pertti. 1989: Birds as a tool in environmental monitoring. – Ann. Zool. Fennici 26:153-166.

8) Ramachandra TV, Asulabha KS, Sincy V, SudarshanBhat and BharathH.Aithal, 2015. Wetlands: Treasure of Bangalore, ENVIS Technical Report 101, Energy & Wetlands Research Group, CES, IISc, Bangalore, India

GALLERY

Yediyur Lake:



Walking Path

Concreted Lake Shore with Garbage

Arekere Lake:

Water Stagnation near Sewage Inlet

Garbage Disposed at the Lake Shore