

Urbanization impact on avifauna population and its status in Gulbarga city, Karnataka, India

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ABSTRACT

The avifauna of Gulbarga city was studied for a period of one year. Gulbarga city has got one reservoir in the heart of the city, the Shree Sharnabasveshwar Lake. The city has well protected by greenery, Gulbarga University Campus, Kapnoor (Industrial area). During the study of three different transects lines, 30 plants species and 42 birds species were observed, in which 35 are resident species, 6 winter migrant and 1 summer migrant respectively. Highest population of Cattle Egret (*Bubulcus ibis*) and Blue Rock Pigeon (*Columba livia*) was recorded in this study. The visitors include White-necked stork (*Ciconia episcopus*), Yellow Wagtail (*Motacilla flava*) which are found in the study area. According to status of birds maximum (average) numbers of birds were found in highly urbanized area when compared to industrial area, but species wise variation was high in low urbanized compared to that of highly urbanized area.

Keywords: Avifauna; Shree Sharnabasveshwar lake; Gulbarga

1. INTRODUCTION

Birds are found throughout the world, at approximately all altitudes and in nearly every climate. They are a natural way to control pests in gardens, on farms, and other places. They aid in the pollinization of plants. By landing on a plant or sucking the nectar from a flower, and then moving on to the next, a bird does the job usually associated with bees. Birds also have a good system for spreading seeds. They eat berries and then when they "dispose of" their waste, the berry seeds are disposed along with it. Bird feces provide good fertilization for the seeds with which they are dropped, giving seeds very good conditions with which to grow. Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Now-a-days, avifaunal diversity has been decreasing due to the destruction of natural habitats and human disturbances. Random destruction of natural habitats by cutting nesting trees and foraging plants for commercial use of woods and lands are the main factor responsible for narrow down in avian foraging habitat and their nesting sites.

Thus, many species of birds may be forced to inhabit in the urban areas and constrain them to breed there (Harney, N.V. 2014).

Birds are found over the entire Earth. One of the most intriguing aspects of bird biology is the ability to migrate exceptional distances. Birds possess highly specialized directional

senses for orientation, navigation, homing and migration, including the ability to detect the Earth's magnetic field. These uncanny abilities permit birds to occupy distinctive wintering and nesting grounds, thus expanding their usable habitats. Some migrations, such as that of the Arctic tern, involve a circumatlantic migration from Alaska to the South Pole. There are some 9700 species of birds living today; some 5000 species belong to the order Passeriformes, the perching birds or songbirds. The number of avian orders is still controversial and texts show different arrangements. The avifauna of India includes around 1301 species, of which 42 are endemic and 26 are rare or accidental. 82 species are globally threatened. The Indian Peacock (*Pavo cristatus*) is the national bird of India, with almost 150 species having become extinct after the arrival of humans (Manoj Kale1 *et al.*).

Shochat, (2004) reported that urban birds are expected to produce lower-quality offspring than rural birds. One reason for this is that selection may favor parents producing large broods at the expense of fledglings' body condition, because even low-quality offspring may have high chances of survival in urban habitats. (Richner, 1989; Pierotti and Annett, 2001; Mennechez and Clergeau, 2006) found that adverse ecological effects may constrain the body size or condition of offspring. For example, several studies found that nestlings in urban habitats are fed by a reduced amount of, or lower quality food and reach lower body mass than nestlings in natural habitats. Eeva and Lehikoinen (1996) found that the contamination of food, water or soil by toxic materials (e.g. heavy metals) may have similar detrimental effects on nestling development. Many species have become extinct through human activities like excessive hunting, logging, large-scale use of insecticides and pesticides in agriculture and industrial pollution. Two birds that have become extinct in India are Mountain Quail and the Pink-Headed Duck.

Numerous species have come to depend on human activities for food and are widespread to the point of being pests. They have adapted well to the rapid urbanization and growth in human population. For example, the House Crow and Rock Pigeon thrive near human habitation in large parts of the world. While in addition to these two species, the Common Myna, Bank Myna and Black Kite are thriving in India; Vultures (Aegypinae) and the House Crow are facing an inexplicable decline in their population. Modern house construction has meant that house sparrows struggle to find adequate nesting sites in today's matchbox shaped houses. These buildings and houses have glass or Aluminium composite exterior of walls, which offer no place for nesting. The growth of cities and the increase in real estate prices have led to destruction of old houses and new modern buildings are constructed in their places. All these changes have resulted in lack of nesting sites for our winged friends.

The present study is focused not only on impact of urbanization on avifauna and also the status of the species in study area.

2. MATERIALS AND METHODS

The study area was surveyed for recording of avifauna diversity by applying line transect method, (Sale and Berkmuller 1988), and point transect method (Verner 1985). A preliminary survey was conducted in all three areas from Feb. 2012 to March 2013. Keeping in view the large size of the study area was adopted for studying the avifauna of in three areas of Gulbarga city (Gulbarga University campus, Shree Sharnabasveshwar lake, kapnoor Industrial area) (Fig 1). The study was conducted at monthly intervals. The other most important aspect kept in consideration was to make the observation during the activity of

birds. Since the peak activity in most birds lasts for 1 or 2 hours after sunrise or before sunset, so monitoring of transects was done either in early morning or late evening hours as used by Thakur [Thakur, M.L. 2008]. Besides visits were also made during different hours of the day. Photography was done by making use of Sony DH-7 (8.1 mp with x15 optical zoom lenses) camera. For identification and field-diagnosis of birds, colored plates of (Ali and Ripley 1968-74), and (Grewal *et al.*, 2002) were used.

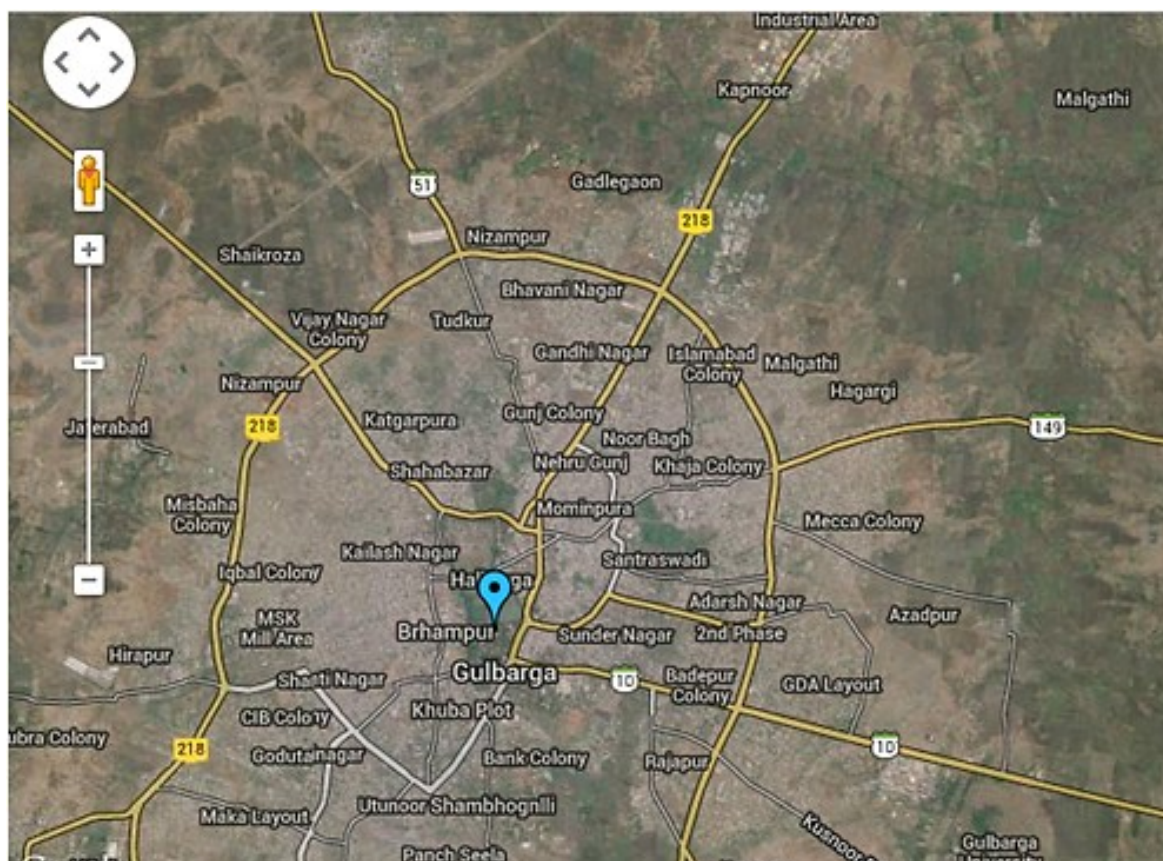


Figure 1. Study Area.

3. RESULTS AND DISCUSSION

The avifauna of Gulbarga city was studied for a period of one year. During the study of three different transects lines 30 (Table. 1) (Manoj Kale1 *et al.*) Plants species and 42 (Table. 2) birds species were observed; during study in which 35 are resident species, 6 winter migrant and 1 summer migrant respectively were identified. Birds used Neem, Wad etc plants for food, roosting and nesting which play important role for their survival. Highest population of Cattle Egret (*Bubulcus ibis*) and Blue Rock Pigeon (*Columba livia*) was recorded in this study. The visitors include White-necked stork (*Ciconia episcopus*), Yellow Wagtail (*Motacilla flava*) which are found in the study area throughout the study period, Maximum (average) numbers of birds were observed in highly urbanized area compared to that of Industrial area, but species wise variation maximum (average) numbers of birds were found in low urbanized then highly urbanized area (Table. 3).

Table 1. Check List of Plants.

Sr. No.	COMMON NAME	SCIENTIFIC NAME
1	Ashok	<i>Polyalthia longifolia</i>
2	Sonmohar	<i>Peltophorum pterocarpum</i>
3	Gulmohar	<i>Delonix regia</i>
4	Karanj	<i>Pongamia pinnata</i>
5	Neem	<i>Azardirachta indica</i>
6	Wild Badam	<i>Terminalia catappa</i>
7	Sissoo	<i>Dalbergia sissoo</i>
8	Kanchan	<i>Bauhinia purpurea</i>
9	Bakul	<i>Mimusops elengi</i>
10	Silver Oak	<i>Graviella robusta</i>
11	Palas	<i>Butea monosperma</i>
12	Arjun	<i>Terminalia arjuna</i>
13	Moha	<i>Madhuca longifolius var. latifolia</i>
14	Babul	<i>Acacia nilotica</i>
15	Hiwar	<i>Acacia leucophloea</i>
16	Nilgiri	<i>Eucalyptus globosa</i>
17	Bamboo	<i>Dendrocalamus strictus</i>
18	Mango	<i>Mangifera indica</i>
19	Jamun	<i>Syzgium cumini</i>
20	Ber	<i>Ziziphus mauritiana</i>
21	Bel	<i>Aegle marmelos</i>
22	Sitaphal	<i>Annona squamosa</i>
23	Ramphul	<i>Anona reticulate</i>
24	Guava	<i>Psidium guajava</i>
25	Karwanda	<i>Carissa bispinosa</i>
26	Raimunia	<i>Lantana camera</i>
27	Wad	<i>Ficus benghalensis</i>
28	Rui	<i>Calatropis procera</i>
29	Pimpal	<i>Ficus religiosa</i>
30	Umbar	<i>Ficus racemosa</i>

Table 2. A systematic list of birds with their status and food habitat during the study period.

SCIENTIFIC NAME	COMMON NAME	S	F
Podicipedidae			
<i>Tachybaptus ruficoliis</i>	Little Grebe	R	P
Phalacrocoracidae			
<i>Phalacrocorax niger</i>	Little Cormarant	WM	P
Ardeidae			
<i>Ardea cinerea</i>	Grey Heron	WM	P
<i>Ardeola grayii</i>	Pond Heron	R	P
<i>Bubulcus ibis</i>	Cattle Egret	WM	P
Ciconiidae			
<i>Ciconia episcopus</i>	White-necked stork	WM	P
Threskiomithidae			
<i>Threskiornis aethiopica</i>	White Ibis	R	P
Anatidae			
<i>Anas poecilohyncha</i>	Spotbill	R	P
Accipitridae			
<i>Milvus migrans</i>	Common Pariah Kite	R	C
Phasianidae			
<i>Fringilla monticola</i>	Grey Partridge	R	O
<i>Gallus gallus</i>	Red jungle fowl	R	O
<i>Pavo cristatus</i>	Common peafowl	R	O
Rallidae			
<i>Amaurornis phoenicurus</i>	Water Hen	R	I, G
<i>Fulica atra</i>	Coot	R	O
Charadriidae			
<i>Himantopus himantopus</i>	Black-winged stilt	R	I
<i>Vanellus indicus</i>	Red-wattled lapwing	R	I
<i>Vanellus malabaricus</i>	Yellow-wattled lapwing	R	I
Rostratulidae			
<i>Rostratula bengalensis</i>	Painted Snipe	R	G,I

Laridae			
<i>Stema hirundo</i>	Common Tern	WM	P
Columbidae			
<i>Columba livia</i>	Blue Rock Pigeon	R	G, F
<i>Streptopelia decaocto</i>	Ring Dove	R	G, F
<i>Streptopelia senegalensis</i>	Laughing Dove	R	G, F
Psittacidae			
<i>Psittacula krameri</i>	Rose Ringed Parakeet	R	F
Cuculidae			
<i>Eudynamys scolopaea</i>	Koel	R	F, I
Dacelonidae			
<i>Halcyon smyrnensis</i>	White-Breasted kingfisher	R	P
Meropidae			
<i>Merops superciliosus</i>	Bluecheeked Bee-Eater	R	I
Coraciidae			
<i>Coracias benghalensis</i>	Indian Roller	R	I
Capitonidae			
<i>Megalaima haemacephala</i>	Coppersmith Barbet	R	F
Hirundinidae			
<i>Hirundo rustica</i>	Swallow	R	I
Corvidae			
<i>Oriolus oriolus</i>	Golden oriole	SM	O
<i>Dicrurus paradiseus</i>	Black Drongo	R	C
<i>Dendrocitta vagabunda</i>	Tree Pie	R	O
<i>Corvus splendens</i>	House Crow	R	O
Sturnidae			
<i>Sturnus pagodarum</i>	Brahminy Myna	R	O
<i>Acridotheres tristis</i>	Indian Myna	R	O
Pycnonotidae			
<i>Pycnonotus cafer</i>	Red-vented Bulbul	R	F
Muscicapidae			
<i>Turdoides malcolmi</i>	Large Grey Babbler	R	I
<i>Saxicoloides fulicata</i>	Indian Robin	R	I

Sylviidae			
<i>Orthotomus sutorius</i>	Common Tailorbird	R	I
Passeridae			
<i>Motacilla citreola</i>	Yellowheaded Wagtail	WM	I
Nectariniidae			
<i>Nectarinia zeylonica</i>	PurpleRumped Sunbird	R	F, G, I
Ploceidae			
<i>Passer domesticus</i>	House Sparrow	R	G, I

Table 3. Status of bird's species in three transects line.

SCIENTIFIC NAME	COMMON NAME	S	T:1	T:2	T:3
Podicipedidae					
<i>Tachybaptus ruficollis</i>	Little Grebe	R	9.52	0	0
Phalacrocoracidae					
<i>Phalacrocorax niger</i>	Little Cormarant	WM	19.04	0	0
Ardeidae					
<i>Ardea cinerea</i>	Grey Heron	WM	9.52	0	0
<i>Ardeola grayii</i>	Pond Heron	R	2.38	2.38	0
<i>Bubulcus ibis</i>	Cattle Egret	WM	23.80	95.23	47.61
Ciconiidae					
<i>Ciconia episcopus</i>	White-necked stork	WM	23.80	19.04	0
Threskiomithidae					
<i>Threskiornis aethiopica</i>	White Ibis	R	23.80	0	0
Anatidae					
<i>Anas poecilohyncha</i>	Spotbill	R	9.52	0	0
Accipitridae					
<i>Milvus migrans</i>	Common Pariah Kite	R	9.52	4.76	0
Phasianidae					
<i>Francolinus pondicerianusb</i>	Grey Partridge	R	0	9.52	0

<i>Gallus gallus</i>	Red jungle fowl	R	0	0	4.76
<i>Pavo cristatus</i>	Common peafowl	R	0	9.52	9.52
Rallidae					
<i>Amaurornis phoenicurus</i>	Water Hen	R	4.76	4.76	4.76
<i>Fulica atra</i>	Coot	R	4.76	0	0
Charadriidae					
<i>Himantopus himantopus</i>	Black-winged stilt	R	4.76	4.76	4.76
<i>Vanellus indicus</i>	Red-wattled lapwing	R	9.52	9.52	9.52
<i>Vanellus malabaricus</i>	Yellow-wattled lapwing	R	9.52	9.52	9.52
Rostratulidae					
<i>Rostratula bengalensis</i>	Painted Snipe	R	9.52	0	0
Laridae					
<i>Sterna hirundo</i>	Common Tern	WM	4.76	0	0
Columbidae					
<i>Columba livia</i>	Blue Rock Pigeon	R	19.04	47.61	23.80
<i>Streptopelia decaocto</i>	Ring Dove	R	9.52	19.04	19.04
<i>Streptopelia senegalensis</i>	Laughing Dove	R	19.04	19.04	19.04
Psittacidae					
<i>Psittacula krameri</i>	Rose Ringed Parakeet	R	9.52	47.61	23.80
Cuculidae					
<i>Eudynamis scolopaea</i>	Koel	R	9.52	9.52	9.52
Dacelonidae					
<i>Halcyon smyrnensis</i>	White-Breasted kingfisher	R	9.52	9.52	9.52
Meropidae					
<i>Merops superciliosus</i>	Bluecheeked Bee-Eater	R	9.52	47.61	19.04
Coraciidae					
<i>Coracias benghalensis</i>	Indian Roller	R	2.38	2.38	0

Capitonidae					
<i>Megalaima haemacephala</i>	Coppersmith Barbet	R	4.76	19.04	19.04
Hirundinidae					
<i>Hirundo rustica</i>	Swallow	R	19.04	47.61	19.04
Corvidae					
<i>Oriolus oriolus</i>	Golden oriole	SM	0	4.76	4.76
<i>Dicrurus paradiseus</i>	Black Drongo	R	19.04	19.04	19.04
<i>Dendrocitta vagabunda</i>	Tree Pie	R	0	9.52	4.76
<i>Corvus splendens</i>	House Crow	R	19.04	19.04	19.04
Sturnidae					
<i>Sturnus pagodarum</i>	Brahminy Myna	R	19.04	19.04	19.04
<i>Acridotheres tristis</i>	Indian Myna	R	23.80	47.60	23.80
Pycnonotidae					
<i>Pycnonotus cafer</i>	Red-vented Bulbul	R	19.04	47.61	47.61
Muscicapidae					
<i>Turdoides malcolmi</i>	Large Grey Babbler	R	19.04	47.61	47.61
<i>Saxicoloides fulicata</i>	Indian Robin	R	9.52	23.80	23.80
Sylviidae					
<i>Orthotomus sutorius</i>	Common Tailorbird	R	9.52	9.52	9.52
Passeridae					
<i>Motacilla citreola</i>	Yellowheaded Wagtail	WM	2.38	2.38	2.38
Nectariniidae					
<i>Nectarinia zeylonica</i>	PurpleRumped Sunbird	R	9.52	9.52	9.52
Ploceidae					
<i>Passer domesticus</i>	House Sparrow	R	0	19.04	9.52

Note:

Transect line (T 1) 1: Shree Sharnabasveshwar Lake (Highly urbanized area)

Transect line (T 2) 2: Gulbarga University Campus (Low urbanized area)

Transect line (T 3) 3: Kapnoor (Industrial area)

Among the avifauna the most common one in Asia are common crow, house sparrow, myna and egrets. These are found to be more commensal as they always try to live near human settlements and keep control of pests. Among them the house sparrows originated in the mediterranean area was introduced to all parts of the globe by the European traders as means to control insects and is now established as cosmopolitan species. But sparrows are declining in Europe and some Asian countries due to habitat destruction. Hence these are placed under red data book in England in 2003. They are also declining and become rare in Indian cities. However found they are still in good numbers in villages. It is interesting to note that the sparrows and starlings, mynas have attained pest status in USA and are not given any legal protection in the USA (Sruti 2008).

4. CONCLUSION

Urbanization results into higher populations of fewer bird species. But at the same time, number of species is greatly reduced in urban environments. The increase in abundance of House Crows directly results into decreased abundance of forest species like Golden Oriole and Oriental White-eye, Indian Iora and other commoner species of birds, as House Crows are aggressive and predate on the nestlings of these birds. Unlike the mega cities, Gulbarga region of north Karnataka is not yet urbanizing with alarming speed. Town/city planner need to pay attentions to preserve the richness of avifauna of this region. Bird species not only add aesthetic value to our life but also help in agriculture and in maintaining a health ecological balance (Manjunath and Bhaskar Joshi).

Reference

- [1] Ali S., Ripley S. D. 1968-74, The Handbook of Birds of India and Pakistan. Ten volumes. Oxford University Press, New Delhi.
- [2] Eeva T., E. Lehtikoinen, *Oecologia* 108 (1996) 631-639.
- [3] Grewal B., Harvey V., Pfister O. (2002), A photographic guide to birds of India. Perplus Editions (HK) limited. Singapore.
<http://www.maplandia.com/india/karnataka/gulbarga/gulbarga/> accessed 2013
- [4] Harney N.V., *Asian Journal of Multidisciplinary Studies* 2 (2014) 130-135.
- [5] Manjunath and Joshi Bhaskar (2012), Avifaunal diversity in Gulbarga region, North Karnataka.
- [6] Manoj Kale, Nandkishor Dudhe, Raju Kasambe, Sanjay Chakane, Prosun Bhattacharya, *International Journal of Applied Environmental Sciences* 7(1) (2012) 59-76.
- [7] Mennechez G., P. Clergeau, *Acta Oecologica* 30 (2006) 182-191.
- [8] Pierotti R., C. Annett (2001), The ecology of western gulls in habitats varying in degree of urban influence. *Avian Ecology and Conservation in an Urbanizing World* (eds J.M. Marzluff, R. Bowman and R. Donnelly), pp. 307-329. Kluwer Academic Press, Dordrecht, the Netherlands. *Recent Research in Science and Technology* 4(7): 27-34.

- [9] Richner H., *Journal of Animal Ecology* 58 (1989) 427-440.
- [10] Sale and Bermuller (1998), Manual of wildlife Techniques for India. Food and Agriculture Organization of the United Nations, Dehradun
- [11] Shochat E., *Oikos* 106 (2004) 622-626.
- [12] Sruti N. (2008), Ecological studies on house sparrow, passer domesticus in the Bhadravati town, Karnataka state, India. M. Phil. Dissertation, Kuvempu University, Shankarghatta, Karnatak, India.
- [13] Thakur M.L. (2008), Studies on status and diversity of avifauna in Himachal Pradesh. Ph.D. thesis, Himachal Pradesh University, Shimla, India, pp. 306.
- [14] Verner J., *Current Ornithology* 2 (1985) 247-302.

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