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Preliminary study on avian fauna of the Krishna River basin Sangli District, Western Maharashtra, India

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Abstract

The present study on avifaunal diversity carried out for three years at the Krishna River Basin, Sangli District revealed a total of 126 species of birds belonging to 30 families, of which 91 species were resident, 16 migratory, 12 resident and local migratory and 7 species were resident and migratory. Among the migrant birds, Rosy Starling *Sturnus roseus* was dominant in the study area. Commonly recorded resident bird species were, Red vented bulbul, Jungle crow, House sparrow, Common myna, Brahminy myna, Rock pigeon, Spotted dove, Rose ringed parakeet, Indian robin, White-browed fantail-flycatcher and Small sunbird. Most of the families had one or two species, whereas Muscicapidae family alone had 16 species. Forty one species of waterfowls were recorded in this small landscape. Out of 126 bird species, 38 were insectivorous, 28 piscivorous, 25 omnivorous, 19 carnivorous, 9 granivorous, 5 frugivorous and 2 species were nectar sucker and insectivorous. These results suggest that richness of avifauna in the Krishna River Basin, Western Maharashtra might be due to large aquatic ground, varied vegetations and favourable environmental conditions.

Key words

Avifauna, Feeding guild, Krishna River basin

Introduction

India being a mega-diversity center harbors about 1301 species of birds that amounts to 13% of the total birds of the world (Ali, 2012). Birds play an important role in ecosystem as potential pollinators, scavengers and bio-monitors in controlling insect pests and also as excellent ecological indicators. Maharashtra is the second most populous and third largest state by area in India. Avian diversity has been studied by number of workers in Maharashtra state. For example, 171 species of birds at Pohara-Malkhed Forest Reserve and Amaravati University Campus (Wadatkar and Kasambe, 2002), 151 species at Nanded city, south east of Maharashtra (Kulkarni *et al*., 2005), 72 species of birds at Sagareshwar sanctuary, Sangli District (Sathe and Pawar, 2005) and 165 species of birds in Osmanabad District of Maharashtra (Narwade and Fartade, 2011) have been recorded. Wetlands are major habitat for resident and migratory birds, which provide water, food, shelter and sites for nesting and rearing of young ones (Mitsch and Gosselink, 2000; Stewart, 2001). A few notable field surveys on avian diversity have been conducted in major wetlands of India (Nazneen *et al*., 2001; Awan *et al.,* 2004; Bhat *et al*., 2009; Sonal *et al*., 2010; Narayanan *et al*., 2011; Saikia and Devi, 2011; Balkhande *et al.,* 2012). However, information on wetland avian fauna at Maharashtra is much limited. Pawar *et al*. (2010) have recorded 95 species of birds in three water reservoirs from Satara district. Although, Kumbhar *et al.* (2009) previously reported 99 species of birds at Krishna River near Sangli city; there is lack of information in many fields of Krishna River birds. Therefore, the present investigation was an attempt to make comprehensive checklist, seasonal variation in the species, migratory status, feeding habit guild and threats of avifauna of the Krishna River Basin, Western Maharashtra.

Materials and Methods

Study area : The study area comes under Western region of Maharashtra that covers 10 km on either sides of Krishna River from Karad city (17º17'N and 74º10'E) to Mhaishal (16º49'N and 74º43'E) state border of Maharashtra, approximately 105 km length (Fig. 1). There are many small natural and artificial ponds,

pools, channels and marshy areas along the River bank. The Krishna River basin has rich natural vegetation of southern dry mixed deciduous and southern thorn forests (Kumbar and Patil, 2011). It usually receives average annual rainfall of 300 to 450 mm between June-October and absolute minimum and maximum temperature is 10 and 41º C, respectively. The familiar flowering plants are Tamarind *(Tamarind indica)*, Mango (*Mangifera indica*), Palas (*Butea monosperma*), Neem (*Azadarichta indica*), Kashid *(Cassia fistula)*, Gulmolhar (*Delonix regia*), Anjan *(Memecylon umbellatum)*, Nilgiri *(Eucalyptus sp.)*, Banyan (*Ficus religiosa)*, Fig (*F. bengalensis),* Acacia (*Acacia arabica*), Pangara *(Erythrina indica),* Chilar *(Caesalpina spinosa)*, Sisav (*Dalbergia sissoo*), Bor *(Zizyphus jujuba),* Karanj *(Pongamia glabra)*, and Shirish *(Albezzia lebbek)* etc. Number of aquatic plants species like *Vallisneria* sp., *Pistia* sp., *Cyperus* sp., *Hydrilla* sp., *Chara* sp., *Eicchornia crassipes* etc. are also found in and around the river. The most commercial cultivating crops are sugar cane, grapes, turmeric, ginger, banana and betel.

Methods : Extensive survey was conducted at 20 different sites on the either side of Krishna River basin from June 2010 to June 2013. The observations of bird species were made from early morning to late evening. Point count method was used for observation and identification of bird species. The birds were sighted using an Olympus Binocular (10 x 40, field 7.8), and photographed, wherever it was possible. Birds were identified by using the field guides (King *et al*., 1991; Grimmett *et al.,* 2009; Ali, 2012). The list of bird species were arranged family wise following Manakadan and Pittie (2001). On compilation, the relative number of species to the respective family was arranged. The feeding habit guild of bird species were categorized as insectivorous, piscivorous, omnivorous, carnivorous, granivorous, frugivorous and nectar sucker and insectivorous. The birds were also categorized as resident (R), migratory (M), resident and local migratory (R/LM) and resident and migratory (R/M) on the basis of regular observations. Waterfowls were identified on the basis of keys provided by Ali (2012). The abundance of bird species were categorized as common (species were encountered frequently 7 - 8 times in 10 visits), moderate (species were encountered 4 - 5 times in 10 visits) and rare (which were observed less frequently 1 - 2 times in 10 visits) according to Saikia and Saikia (2000).

Results and Discussion

A total of 126 bird species belonging to 30 families were recorded in the Krishna River basin during 3-year study period (Table 1). Out of 30 families, 15 families were represented by one or two species, while two families Ardeidae and Muscicapidae were represented by 9 and 16 species respectively. Feeding habit of each bird species was observed cautiously. Analysis of feeding guild revealed 38 insectivorous, 28 piscivorous, 25 omnivorous, 19 carnivorous, 9 granivorous, 5 frugivorous and 2 nectar sucker and insectivorous birds (Fig. 2). Of the total species, 57 were recorded as common, 52 as moderate and 17 as rare species (Table 1). Out of 126 bird species, 91 (72.22%) were resident, 16 (12.69%) were migratory, 12 (9.52%) were resident and local migratory and 7 (5.55%) were resident and migratory (Fig. 3). Among migrants, Rosy starling (*Sturnus roseus)* was dominant during winter and summer season. Commonly observed resident bird species were, Red vented bulbul, Jungle crow, House sparrow, Common myna, Brahminy myna, Blue rock pigeon, Spotted dove, Rose-ringed parakeet, Indian robin, White-browed fantail-flycatcher, Oriental Magpie-Robin, Ashy prinia and Small sunbird. There were fluctuations in occurrence of bird species in the study area as indicated by the occurrence of 82 species in all seasons, 26 in winter, 12 in summer and 6 species in monsoon season. Three species of Larks were recorded during winter season.

Forty one (33.33%) species of waterfowl were observed in the study area. Increased dominancy of waterfowl was noticed following inflow of winter migrants like, Grey heron, Little egret, Median egret, Painted stork, Asian open bill stork, Oriental white Ibis, Black Ibis along with resident aquatic birds. Moreover, very rich fertile land with commercial agricultural crops, thick bushes and scattered trees around the river. Seasonal variation in water level in the Krishna River is dependent on the amount of rainfall received in the catchment area. The depth of water varies from 30-35 feet during rainy season to 6-8 feet during summer; drought was never noticed in this area during the study period. Therefore, the dominancy of waterfowl in the study area might be due to availability of food materials, huge aquatic ground for shelter, perching and breeding.

Winter visitors like, Common greenshank, Common redshank, Spotted redshank with resident birds White breasted kingfisher, Small blue kingfisher, Blue-eared kingfisher, Lesser pied kingfisher, Red wattled lapwing, Little ringed plover, Pond heron were also observed along the river bank, open irrigation canal and shallow running water region. Besides, White breasted moorhen, Purple moorhen, Purple heron and Pond heron were observed in the marshy areas near Karad and Sangli cities and Kundal village. These species seem to be adapted to endure regular anthropogenic disturbances. Previously anthropogenic disturbance tolerance behavior in marshy area birds of Anekere wetland was observed by Bhat *et al*. (2009).

The present study reveals a high percentage (30.16 %) of insectivorous bird diversity (Fig. 2) as compared to birds with other food habits in dry deciduous forests of Sangli district. Similar dominancy of insectivorous bird population has been reported in Amaravati district comprised of evergreen, semi-evergreen and deciduous forests (Wadatkar and Kasambe, 2002) and Nanded city which includes dry-deciduous forests (Kulkarni *et al.,* 2005). In the present study, the dominance of insectivorous birds during winter and summer season could be due to the entry of migrant species like, Rosy starlings, Wire-tailed swallow, Small bee eaters and Wagtails besides the insectivorous resident species.

Insectivorous dominancy exactly coincides with flowering and fruiting season of many angiosperm plants many angiosperm plants. Flowers of bright colour produce good quality of nectar and fleshy fruits. These factors might be responsible for increasing insect prey resource during winter and early summer season as a resultant rise in the insectivorous bird population.

Rosy starlings were found generally on the red silk cotton tree, (*B. ceiba*) and restlessly feeding on the insects associated with the red flowers of the deciduous tree in bloom (Desai and Shanbhag, 2012). In the present study, large flocks of winter migratory bird Rosy starling (*S. roseus)* were observed between last week of December and second week of April. The presence of

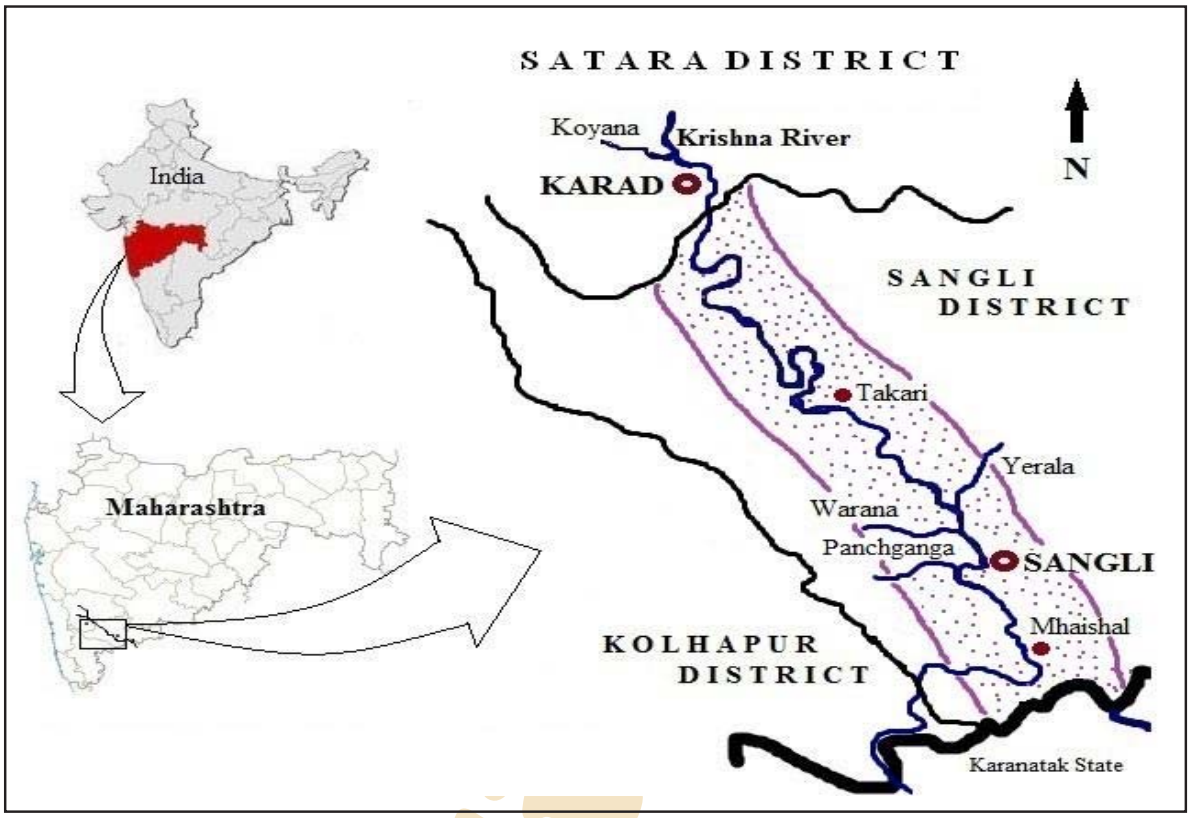

Fig. 1 : Study area map

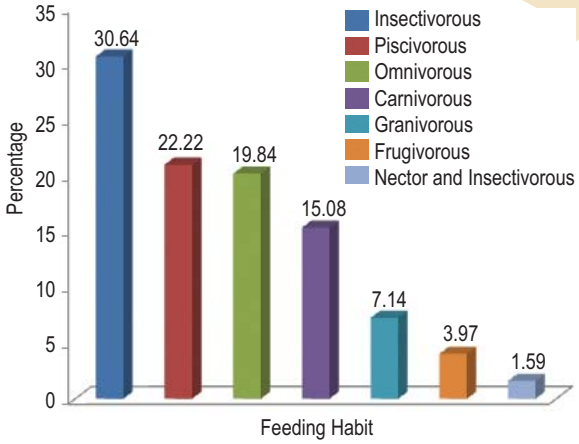

Fig. 2 : Percentage of bird species related with feeding habit

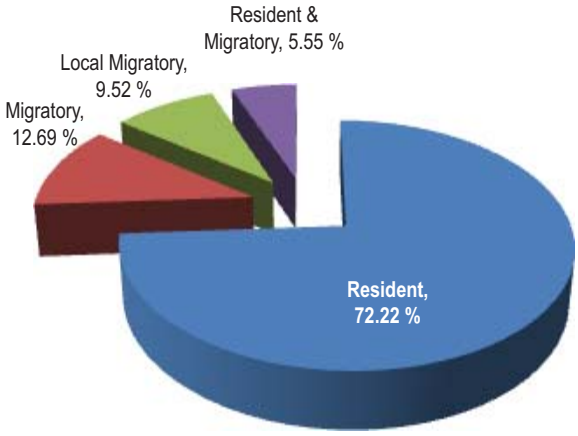

Fig. 3 : Migratory status of bird species in the Krishna River basin

Table 1 : List of birds of the Krishna River Basin, Sangli District, Western Maharashtra, India

Syn. No.	Common name	Scientific name	Migratory	Feeding status	Abundance habit	Season
	Podicipitidae					
5	Little Grebe*	*Tachybaptus ruficollis* (Pallas)	R	P	C	Monsoon
27	Indian Shag*	*Phalacrocorax fuscicollis* (Stephens)	R	P	C	All
	Phalacrocoracidae					
28	Little Cormorant*	*Phalacrocorax niger* (Vieillot)	R	P	C	All
	Ardeidae					
35	Grey Heron*	*Ardea cinerea* (Linnaeus)	R/M	P	C	Summer
37	Purple Heron*	*Ardea purpurea* (Linnaeus)	R	P	M	Winter
38	Little Green Heron*	*Butorides striatus* (Linnaeus)	R	P	C	All
42	Indian Pond-Heron*	*Ardeola grayii* (Sykes)	R	P	C	All
44	Cattle Egret*	*Bubulcus ibis* (Linnaeus)	R	P	C	All
46	Large Egret*	*Casmerodius albus* (Linnaeus)	R/LM	P	C	Summer
48	Median Egret*	*Mesophoyx intermedia* (Wagler)	M	P	C	Winter
49	Little Egret*	*Egretta garzetta* (Linnaeus)	R/M	P	C	All
52	Black-crowned Night Heron*	*Nycticorax nycticorax* (Linnaeus)	R/LM	P	R	Winter
	Ciconiidae					
60	Painted Stork*	*Mycteria leucocephala* (Pennant)	R/LM	P	R	Summer
61	Asian Openbill-Stork*	*Anastomus oscitans* (Boddaert)	R/LM	P	M	Summer
62	White-necked Stork*	*Ciconia episcopus* (Boddaert)	R	P	M	All
65	Black Stork*	*Ciconia nigra* (Linnaeus)	R	C	R	All
	Threskiornithidae					
69	Oriental White Ibis*	*Threskiornis melanocephalus* (Latham)	M	P	M	Summer
70	Black Ibis*	*Pseudibis papillosa* (Temminck)	R	P	R	Summer
71	Glossy Ibis*	*Plegadis falcinellus* (Linnaeus)	R	P	M	All
72	Eurasian Spoonbill*	*Platalea Leucorodia* (Linnaeus)	M	P	R	Summer
	Anatidae					
90	Brahminy Shelduck*	*Tadorna ferruginea* (Pallas)	M	P	R	Winter
97	Spot-billed Duck*	*Anas poecilorhyncha* (Forster)	R/LM	P	C	All
	Accipitridae					
124	Black-shouldered Kite	*Elanus caeruleus* (Desfontaines)	R	C	M	All
130	Oriental Honey-Buzzard	*Pernis ptilorhyncus* (Temminck)	R/M	C	M	All
133	Black Kite	*Milvus migrans* (Boddaert)	R/M	C	C	All
135	Brahminy Kite	*Haliastur indus* (Boddaert)	R/M	C	C	All
138	Shikra	*Accipiter badius* (Gmelin)	R	C	M	All
	Phasianidae					
246	Grey Francolin	*Francolinus pondicerianus* (Gmelin)	R	O	M	All
250	Common Quail	*Coturnix coturnix* (Linnaeus)	R	O	M	All
259	Rock Bush-Quail	*Perdicula argoondah* (Sykes)	R	G	R	Monsoon
299	Red Junglefowl	*Gallus gallus* (Linnaeus)	R	O	M	All
301	Grey Junglefowl	*Gallus sonneratti* (Temminck)	R	C	M	All
311	Indian Peafowl	*Pavo cristatus* (Linnaeus)	R	O	C	All
	Rallidae					
343	White-breasted Waterhen*	*Amaurornis phoenicurus* (Pennant)	R	O	C	All
347	Common Moorhen*	*Gallinula chloropus* (Linnaeus)	R	O	C	All
349	Purple Moorhen*	*Porphyrio porphyrio* (Linnaeus)	R	O	C	Monsoon
350	Common Coot*	*Fulica atra* (Linnaeus)	R	O	M	All
	Jacanidae					
359	Bronze-winged Jacana*	*Metopidius indicus* (Latham)	R	O	M	All
	Charadriidae					
366	Red-wattled Lapwing*	*Vanellus indicus* (Boddaert)	R	C	C	Summer
380	Little Ringed Plover*	*Charadrius dubius* (Scopoli)	R	C	M	Summer
	Scolopacidae					
392	Spotted Redshank*	*Tringa erythropus* (Pallas)	M	C	M	Winter
393	Common Redshank*	*Tringa totanus* (Linnaeus)	M	C	M	Winter
396	Common Green Shank*	*Tringa nebularia* (Gunner)	R/M	C	M	Winter

	Recurvirostridae					
430	Black-winged Stilt*	*Himantopus himantopus* (Linnaeus)	R	O	M	Summer
	Laridae					
458	Whiskered Tern	*Chlidonias hybridus* (Pallas)	M	P	M	Winter
475	Little Tern	*Sterna albifrons* (Pallas)	M	P	M	Winter
	Columbidae					
517	Blue Rock Pigeon	*Columba livia* (Gmelin)	R	G	C	All
534	Eurasian Collared-Dove	*Streptopelia decaocto* (Frivaldaszky)	R	G	C	All
535	Red Collared-Dove	*Streptopelia tranquebarica* (Hermann)	R	G	C	All
537	Spotted Dove	*Streptopelia chinensis* (Scopoli)	R	G	C	All
541	Little Brown Dove	*Streptopelia senegalensis* (Linnaeus)	R	G	C	All
	Psittacidae					
550	Rose-ringed Parakeet	*Psittacula krameri* (Scopoli)	R	F	C	All
557	Plum-headed Parakeet	*Psittacula cyanocephala* (Linnaeus)	R / M	F	M	All
	Cuculidae					
571	Pied Crested Cuckoo	*Clamator jacobinus* (Boddaert)	R / LM	I	R	Monsoon
576	Indian Cuckoo	*Cuculus micropterus* (Gould)	R	I	M	Monsoon
588	Drongo Cuckoo	*Surniculus lugubris* (Horsfield)	R	I	M	All
590	Asian Koel	*Eudynamys scolopacea* (Linnaeus)	R	I	C	All
602	Greater Coucal	*Centropus sinensis* (Stephens)	R	C	C	All
	Strigidae					
630	Dusky Eagle-Owl	*Bubo coromandus* (Latham)	R	C	M	All
636	Jungle Owlet	*Glaucidium radiatum* (Tickell)	R	C	R	All
657	Mottled Wood-Owl	*Strix ocellata* (Lesson)	R	C	R	All
	Apodidae					
703	House Swift	*Apus affinis* (Gray)	R	I	C	All
707	Asian Palm-Swift	*Cypsiurus balasiensis* (Gray)	R	I	C	All
	Alcedinidae					
719	Lesser Pied Kingfisher*	*Ceryle rudis* (Linnaeus)	R	P	M	All
722	Small Blue Kingfisher*	*Alcedo atthis* (Linnaeus)	R	P	C	All
725	Blue-eared Kingfisher*	*Alcedo meninting* (Horsfield)	R	P	C	All
736	White-breasted Kingfisher*	*Halcyon smyrnensis* (Linnaeus)	R	P	C	All
	Meropidae					
750	Small Bee-eater	*Merops orientalis* (Latham)	R	P	C	All
	Coracidae					
756	Indian Roller	*Coracias benghalensis* (Linnaeus)	R / LM	C	M	All
	Upupidae					
765	Common Hoopoe	*Upupa epops* (Linnaeus)	M	I	C	Winter
	Bucerotidae					
767	Indian Grey Hornbill	*Ocyceros birostris* (Scopoli)	R	O	M	All
768	Malabar Grey Hornbill	*Ocyceros griseus* (Latham)	R	O	R	Winter
	Capitonidae					
790	Crimson-throated Barbet	*Megalaima rubricapilla* (Gmelin)	R	F	M	All
792	Coppersmith Barbet	*Megalaima haemacephala* (Muller)	R	O	M	All
	Picidae					
847	Yellow-fronted Pied Woodpecker	*Dendrocopos mahrattensis* (Latham)	R	I	M	All
	Alaudidae					
873	Bengal Bush-Lark	*Mirafra assamica* (Horsfield)	M	O	R	Winter
877	Red -winged Bush-Lark	*Mirafra erythroptera* (Blyth)	R	G	R	All
883	Rufous –tailed Finch-Lark	*Ammomanes phoenicurus* (Franklin)	R	G	R	All
914	Dusky Crag -Martin	*Hirundo concolor* (Sykes)	R	G	C	All
	Hirundinidae					
916	Common Swallow	*Hirundo rustica* (Linnaeus)	R / LM	I	C	All
921	Wire-tailed Swallow	*Hirundo smithii* (Leach)	R / LM	I	M	Winter
922	Streak-throated Swallow	*Hirundo fluvicola* (Blyth)	R / LM	I	M	Winter
	Lanidae					
946	Rufous-backed Shrike	*Lanius schach* (Linnaeus)	R	I	C	Winter
	Oriolidae					
953	Eurasian Golden Oriole	*Oriolus oriolus* (Linnaeus)	M	O	R	Winter
	Dicruridae					

962	Black Drongo	*Dicrurus macrocercus* (Vieillot)	R	C	M	Summer
965	Ashy Drongo	*Dicrurus leucophaeus* (Vieillot)	R	C	M	Summer
	Sturnidae					
994	Brahminy Starling	*Sturnus pagodarum* (Gmelin)	R	O	C	All
996	Rosy Starling	*Sturnus roseus* (Linnaeus)	M	O	M	Winter
1006	Common Myna	*Acridotheres tristis* (Linnaeus)	R	O	C	All
	Corvidae					
1048	House Crow	*Corvus splendens* (Vieillot)	R	O	M	All
1054	Jungle Crow	*Corvus macrorhynchos* (Wagler)	R	O	C	All
	Campephagidae					
1070	Common Woodshrike	*Tephrodornis pondicerianus* (Gmelin)	R	I	M	Winter
1067	Large Woodshrike	*Tephrodornis gularis* (Temminck)	R	I	M	All
1100	Common Iora	*Aegithina tiphia* (Linnaeus)	R	I	M	All
1102	Marshall's Iora	*Aegithina nigrolutea* (Marshall)	R	I	M	All
1123	White-eared Bulbul	*Pycnonotus leucotis* (Gould)	R	F	R	All
1128	Red-vented Bulbul	*Pycnonotus cafer* (Linnaeus)	R	F	C	All
	Muscicapidae					
1231	Yellow-eyed Babbler	*Chrysomma sinese* (Gmelin)	R	O	M	All
1258	Large Grey Babbler	*Turdoides malcolmi* (Sykes)	R	O	C	All
1451	White-browed Fantail-Flycatcher	*Rhipidura aureola* (Lesson)	R	I	C	All
1458	White-throated Fantail-Flycatcher	*Rhipidura albicollis* (Vieillot)	R	I	C	All
1506	Rufous-fronted Prinia	*Prinia buchanani* (Blyth)	R	I	M	All
1511	Plain Prinia	*Prinia inornata* (Gmelin)	R	I	C	All
1517	Ashy Prinia	*Prinia socialis* (Sykes)	R	I	C	All
1521	Jungle Prinia	*Prinia sylvatica* (Jerdon)	R	I	C	All
1535	Common Tailorbird	*Orthotomus sutorius* (Pennant)	R	I	C	All
1601	Large-billed Leaf-Warbler	*Phylloscopus magnirostris* (Blyth)	M	I	M	Winter
1602	Greenish Leaf-Warbler	*Phylloscopus trochiloides* (Sundevall)	R / LM	I	M	Winter
1661	Oriental Magpie-Robin	*Copsychus saularis* (Linnaeus)	R	I	C	All
1692	Indian Chat	*Cercomela fusca* (Blyth)	R / LM	I	C	All
1700	Pied Bushchat	*Saxicola caprata* (Linnaeus)	R	I	C	All
1704	Jerdon's Bushchat	*Saxicola jerdoni* (Blyth)	R	I	M	All
1717	Indian Robin	*Saxicoloides fulicata* (Linnaeus)	R	I	C	All
	Paridae					
1794	Great Teat	*Parus major* (Linnaeus)	R	O	C	Winter
	Motacillidae					
1883	Yellow Wagtail*	*Motacilla flava* (Linnaeus)	M	I	M	Winter
	Grey Wagtail*	*Motacilla cinerea*	M	I	M	Winter
1885	White Wagtail*	*Motacilla alba* (Linnaeus)	M	I	M	Winter
1891	Larger Pied Wagtail*	*Motacilla maderaspatensis* (Gmelin)	R	I	M	All
	Nectariniidae					
1909	Small Sunbird	*Nectarinia minima* (Sykes)	R	N,I	C	All
1917	Purple Sunbird	*Nectarinia asiatica* (Latham)	R	N,I	C	All
	Passeridae					
1938	House Sparrow	*Passer domesticus* (Linnaeus)	R	O	C	All
1957	Baya Weaver	*Ploceus philippinus* (Linnaeus)	R	O	C	Monsoon
	Estrildidae					
1966	White-throated Munia	*Lonchura malabarica* (Linnaeus)	R	I	M	All
1974	Spotted Munia	*Lonchura punctulata* (Linnaeus)	R	I	C	All
1978	Black-headed Munia	*Lonchura malacca* (Linnaeus)	R	I	M	Winter
	Fringillidae					
2060	Crested Bunting	*Melophus lathami* (Gray)	R	I	R	Winter

*indicates **waterfowl; Syn. No.** – Synopsis numbers as followed by Salim Ali (2012); Common name according to Manakadan and Pittie (2001); **Abbreviations used in the table; Status:** R – Resident; M – Migratory; R/ LM – Resident and Local Migratory; R/M – Resident and Migratory; **Feeding Habit:** I – Insectivorous; O – Omnivorous; C – Carnivorous; G – Granivorous; F – Frugivorous; P – Piscivorous; N,I – Nector & Insectivorous; **Abundance:** C – Common; M – Moderate; R – Rare

Rosy starling coincided with the flowering and fruiting season of most dominant vegetations like grapes (*Virtex nucifera*), Palas (*B. monosperma*) and Fig (*F. benghalensis)* in the study area, with which they were always found associated. Besides, during this period, the study area experienced pleasant environmental conditions.

The result of the present study indicates that the avifauna of Krishna River basin is very diverse and rich due to large sized aquatic ground, varied vegetations and favourable environmental conditions. However, recently anthropogenic activities like sand mining, use of dynamites for fish catching, cutting of trees and brick works have been noticed around the river. If proper control measures are not taken, these could be a potential source for noise, air and water pollutions, thereby leading to destruction of natural avian habitat. Besides, continuous poaching and hunting of bird species for different purposes are still practiced. Therefore, it is high time to bring awareness among local people to reduce pollution, and sustainable utilization and conservation of natural resources.

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