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Comparative study of bird communities in urban academic campuses and riparian habitats of Patna, Bihar, India

Ashfia Zafar, Md Shahbaz, Mohammad Masroor Zafar & Shahla Yasmin*

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Abstract Urban and riparian habitats play distinct roles in supporting avian biodiversity amidst urbanization. This study compares bird assemblages in urban academic campuses and riparian zones along the Ganges River in Patna, Bihar, India, from February to April 2025. Using point count surveys, 62 bird species were recorded. Urban academic campuses (e.g. Patna Science College) were found to have higher species richness than the riparian zones. Probable reason could be greater anthropogenic disturbances in riparian areas (ghats). Cotton tree *(Bombax ceiba)* served as a keystone species in both the habitats, supporting diverse avian assemblages. Heron species showed nesting preferences for sacred fig *(Ficus religiosa)* and cluster fig *(Ficus racemosa)* in urban campuses and mango tree *(Mangifera indica)* and royal poinciana *(Delonix regia)* in riparian zones. These findings underscore the need for urban planning to mitigate anthropogenic impacts in riparian zones and preserve green spaces on academic campuses for avian conservation.

Keywords: bird assemblages, urban green spaces, riparian habitats, heron nesting, cotton tree, anthropogenic disturbance

Összefoglalás A városi és a folyóparti élőhelyek eltérő szerepet játszanak a madárvilág biológiai sokféleségének fenntartásában az urbanizáció közepette. Ez a tanulmány a városi egyetemi kampuszok és a Gangesz folyó menti parti zónák madárállományát hasonlítja össze Patnában (Bihar, India) 2025 februárja és áprilisa között. A pontszámlálások eredményeként 62 madárfajt regisztráltak. A városi egyetemi kampuszokon (pl. Patna Science College) nagyobb fajgazdagságot találtak, mint a parti zónákban. Ennek valószínűsíthető oka a folyóparti területeken jelentkező nagyobb antropogén zavarás lehet. A gyapotfa *(Bombax ceiba)* mindkét élőhelyen kulcsfajként szolgált, és változatos madárvilágnak adott otthont. A gémfélék fészkelési preferenciát mutattak a szent fügefa *(Ficus religiosa)* és a fürtös füge *(F. racemosa)* iránt a városi területeken, valamint a mangó *(Mangifera indica)* és a tűzvirág fa *(Delonix regia)* iránt a parti sávokban. Ezek az eredmények hangsúlyozzák, hogy a várostervezésnek enyhítenie kell az antropogén hatásokat a parti zónákban, és meg kell őrizni a zöldterületeket az egyetemi kampuszokon a madárvédelem érdekében.

Kulcsszavak: madáregyüttesek, városi zöldterületek, folyóparti élőhelyek, gémfészkelés, gyapotfa, antropogén zavarás

Department of Zoology, Patna University, Patna, Bihar 800005, India
** corresponding author, e-mail: shahla.02apex@gmail.com*

Introduction

Urbanization and anthropogenic activities significantly alter avian communities, with urban green spaces and riparian corridors serving as critical refuges (Naiman *et al.* 1993, Melles *et al.* 2003, Kang *et al.* 2015). Guthula *et al.* (2022) reported that academic campuses harbour more than 50% of Indian bird species. Therefore, academic campuses may be better at preserving biodiversity habitats amid changing land use and play important role in metapopulation dynamics (Padilla & Rodewald 2015). According to Singh *et al.* (2024), university campuses are important urban green spaces for biodiversity research particularly avian and plant diversity. In Patna, academic campuses provide diverse vegetation and lower human disturbance, while riparian zones along the Ganges River experience higher human activity. Human activities potentially reduce bird diversity (Seress & Liker 2015, Sun *et al.* 2024). Trees, particularly cotton tree *(Bombax ceiba)*, play a vital role in nesting, feeding, and roosting, shaping avian assemblages (Rao & Koli 2017). Anthropogenic environmental modifications and activities exert substantial selective pressures on avian nesting ecology (Matuoka *et al.* 2020). This study investigates how species richness, heron nesting preferences, and tree utilization differ between urban academic campuses and riparian habitats in Patna.

Methods

Study area

Surveys were conducted from February to April 2025 across eight sites in Patna, Bihar, India. These eight sites were grouped into two distinct habitats: 1) urban academic campuses and 2) riparian zone. Urban academic campuses (25.617660, 85.175984) included Patna Science College, Patna College, Patna Law College, and Patna NIT Campus, characterized by diverse vegetation and lower human disturbance. Riparian zone (25.621582° N, 85.172453° E) along the Ganges River included Kali Ghat to Baharwa Ghat which experienced higher anthropogenic activity. Although the two habitats were closely situated, the tree composition and level of human disturbance varied between the two sites. Human disturbances were caused by religious activities, bathing and fishing.

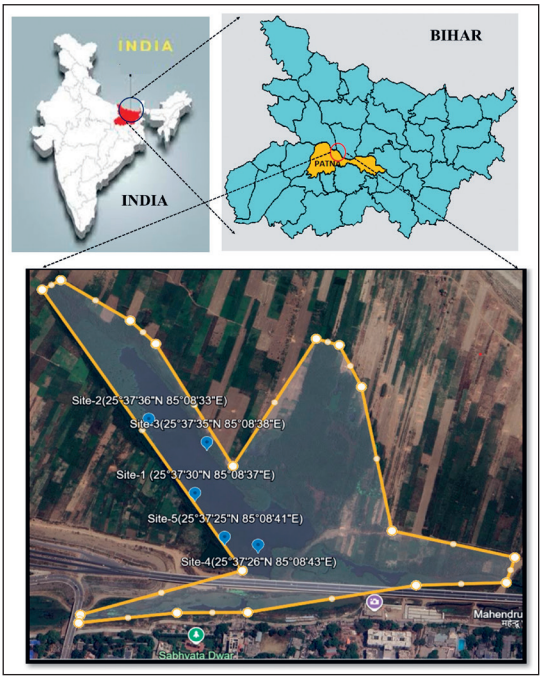

Figure 1. Map of the study area
1. ábra A vizsgálati terület térképe

Data collection

Point count surveys (10-minute counts at fixed points) were conducted during early mornings (7:00 AM) and late afternoons (2:30 PM). A checklist of birds was prepared and the taxonomical orders were arranged following the International Ornithological Congress (IOC) World Bird List (Gill *et al.* 2025). Bird interactions with tree species (e.g. cotton tree, sacred fig *(Ficus religiosa)*, cluster fig *(Ficus racemosa)*, ashoka tree *(Saraca asoca)*, mango tree *(Mangifera indica)*, royal poinciana *(Delonix regia)*, banyan tree *(Ficus benghalensis)*, gum tree (*Eucalyptus* spp.) were recorded, focusing on nesting, feeding, roosting, and perching activities. Nests of four heron species, i.e. Little Black Cormorant *(Phalacrocorax sulcirostris)*, Black-crowned Night Heron *(Nycticorax nycticorax)*, Little Egret *(Egretta garzetta)* and Western Cattle Egret *(Ardea ibis)* were documented along with tree species and habitat. Mann-Whitney test was used to compare the species richness of birds between academic campuses and riparian zones. Chi^2 test was used to compare the nesting activity of herons between the two habitats. Two-way ANOVA was used to study the preference of nesting trees across the two types of habitats. The data were analyzed with GraphPad Prism 8.0.1.

Results

Species richness

A total of 62 bird species were recorded *(Table 1)*. Urban campuses had marginally higher species richness as compared to the riparian zones (U=4, p=0.34, NS) *(Figure 2a)*. Patna Science College recorded the highest diversity (34 species), followed by Patna NIT Campus

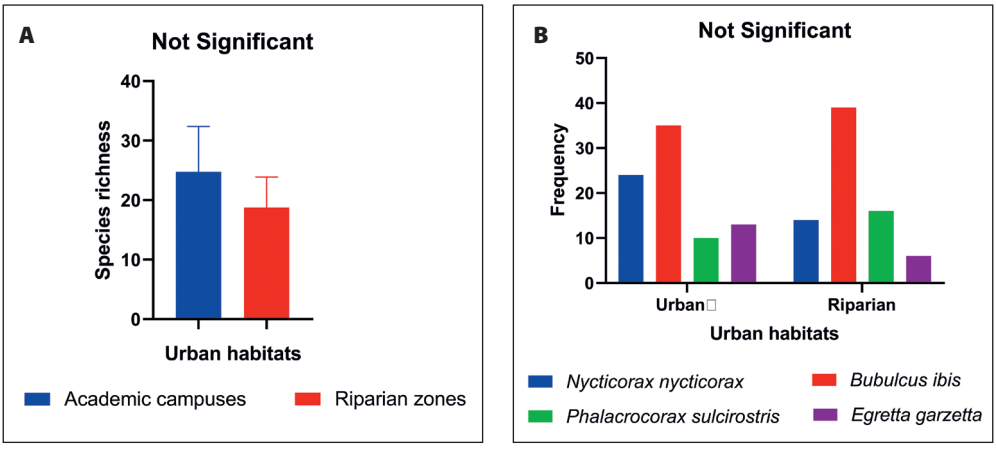

Figure 2. Comparison of species richness (a) and nesting activity (b) between academic campuses and riparian zones

2. ábra A fajgazdagság (a) és a fészkelési aktivitás (b) összehasonlítása az egyetemi épületek és a parti zóna között

(27 species). Riparian sites showed lower diversity: Krishna Ghat (26 species), Gandhi Ghat (18 species), Baharwa Ghat (17 species) and Kali Ghat (16 species). Passeriformes dominated (50% of 62 species), but their diversity was likely reduced by the departure of winter migrants during the warmer February–April period. Riparian zones supported eight aquatic/semi-aquatic species (e.g. herons, Common Sandpiper *Actitis hypoleucos),* while urban campuses favoured terrestrial species (83.3% resident).

Table 1. Checklist of observed bird species. The abbreviations are as follows: LC = Least Concern; NT = Near Threatened; R = Resident; WM = Winter Migrant; SM = Summer Migrant; LM = Local Migrant

1. táblázat A megfigyelt madárfajok listája. A rövidítések a következők: LC = nem veszélyeztetett, NT = közel veszélyeztetett, R = állandó, WM = téli vonuló, SM = nyári vonuló, LM = helyi vonuló

	Order	Family	Species Name	IUCN Status*	Migratory Status
1	Cuculiformes	Cuculidae	Greater Coucal *(Centropus sinensis)*	LC	R
2			Asian Koel *(Eudynamys scolopaceus)*	LC	R
3	Columbiformes	Columbidae	Eurasian Collared Dove *(Streptopelia decaocto)*	LC	R
4			Spotted Dove *(Spilopelia chinensis)*	LC	R
5			Yellow-footed Green Pigeon *(Treron phoenicopterus)*	LC	R
6			Feral Pigeon *(Columba livia domestica)*	LC	R
7	Gruiformes	Rallidae	White-breasted Waterhen *(Amaurornis phoenicurus)*	LC	R
8			Common Moorhen *(Gallinula chloropus)*	LC	R
9	Charadriiformes	Scolopacidae	Common Sandpiper *(Actitis hypoleucos)*	LC	WM
10	Ciconiiformes	Ciconiidae	Asian Openbill Stork *(Anastomus oscitans)*	LC	R/LM
11	Suliformes	Phalacrocoracidae	Little Black Cormorant *(Phalacrocorax sulcirostris)*	LC	R
12	Pelecaniformes	Ardeidae	Little Egret *(Egretta garzetta)*	I	R
13			Western Cattle Egret *(Ardea ibis)*	LC	R
14			Black-crowned Night Heron *(Nycticorax nycticorax)*	LC	R
15			Indian Pond Heron *(Ardeola grayii)*	LC	R
16	Accipitriformes	Accipitridae	Black Kite *(Milvus migrans)*	LC	R
17			Shikra *(Accipiter badius)*	LC	R
18	Strigiformes	Strigidae	Spotted Owlet *(Athene brama)*	LC	R
19		Tytonidae	Western Barn-Owl *(Tyto alba)*	LC	R

	Order	Family	Species Name	IUCN Status*	Migratory Status
20	Bucerotiformes	Bucerotidae	Indian Grey Hornbill *(Ocyceros birostris)*	LC	R
21		Upupidae	Eurasian Hoopoe *(Upupa epops)*	LC	R
22	Coraciiformes	Alcedinidae	White-throated Kingfisher *(Halcyon smyrnensis)*	LC	R
23		Coraciidae	Indian Roller *(Coracias benghalensis)*	LC	R
24		Meropidae	Asian Green Bee-eater *(Merops orientalis)*	LC	R/LM
25			Blue-tailed Bee-eater *(Merops philippinus)*	LC	SM
26	Piciformes	Megalaimidae	Brown-headed Barbet *(Psilopogon zeylanicus)*	LC	R
27			Coppersmith Barbet *(Psilopogon haemacephalus)*	LC	R
28		Picidae	Common Goldenback *(Dinopium javanense)*	LC	R
29			Streak-throated Woodpecker *(Picus xanthopygaeus)*	LC	R
30	Psittaciformes	Psittaculidae	Rose-ringed Parakeet *(Psittacula krameria)*	LC	R
31			Alexandrine Parakeet *(Psittacula eupatria)*	NT	R
32			Plum-headed Parakeet *(Psittacula cyanocephala)*	LC	R
33	Passeriformes	Alaudidae	Sand Lark *(Calandrella raytal)*	LC	R
34		Cisticolidae	Plain Prinia *(Prinia inornata)*	LC	R
35		Corvidae	House Crow *(Corvus splendens)*	LC	R
36			Large-billed Crow *(Corvus macrorhynchos)*	LC	R
37			Rufous Treepie *(Dendrocitta vagabunda)*	LC	R
38		Dicruridae	Black Drongo *(Dicrurus macrocercus)*	LC	R
39		Leiothrichidae	Jungle Babbler *(Turdoides striata)*	LC	R
40		Muscicapidae	Oriental Magpie Robin *(Copsychus saularis)*	LC	R
41			Brown Rock Chat *(Oenanthe fusca)*	LC	R/LM
42			Verditer Flycatcher *(Eumyias thalassinus)*	LC	R/LM
43			Taiga Flycatcher *(Ficedula albicilla)*	LC	WM
44			Asian Brown Flycatcher *(Muscicapa dauurica)*	LC	WM

	Order	Family	Species Name	IUCN Status*	Migratory Status
45	Passeriformes	Motacillidae	Paddyfield Pipit *(Anthus rufulus)*	LC	R
46			White Wagtail *(Motacilla alba)*	LC	WM
47			White-browed Wagtail *(Motacilla maderaspatensis)*	LC	R
48			Grey Wagtail *(Motacilla cinerea)*	LC	R/LM
49			Citrine Wagtail *(Motacilla citreola)*	LC	WM
50		Nectariniidae	Purple Sunbird *(Cinnyris asiaticus)*	LC	R
51		Oriolidae	Black-hooded Oriole *(Oriolus xanthornus)*	LC	R
52			Golden Oriole *(Oriolus oriolus)*	LC	R
53		Passeridae	House Sparrow *(Passer domesticus)*	LC	R
54		Phylloscopidae	Greenish Leaf Warbler *(Phylloscopus trochiloides)*	LC	R
55		Pycnonotidae	Red-vented Bulbul *(Pycnonotus cafer)*	LC	R
56			Red-whiskered Bulbul *(Pycnonotus jocosus)*	LC	R
57		Rhipiduridae	White-throated Fantail *(Rhipidura albicollis)*	LC	R
58		Sturnidae	Common Myna *(Acridotheres tristis)*	LC	R
59			Asian Pied Starling *(Gracupica contra)*	LC	R
60			Brahminy Starling *(Sturnia pagodarum)*	LC	R
61			Bank Myna *(Acridotheres ginginianus)*	LC	R
62		Zosteropidae	Oriental White-eye *(Zosterops palpebrosus)*	LC	R

Heron nesting preferences

Nesting activity was seen at Patna NIT campus and along the riparian zones. Heron nesting patterns varied slightly between habitats (χ^2=6.5, df=3, p=0.09, NS) *(Figure 2b)*. At the NIT Campus, Black-crowned Night Heron preferred cluster fig (12 nests), while Western Cattle Egret established 35 nests, primarily on cluster fig (18 nests) and sacred fig (11 nests) *(Table 2)*. Total nest counts at the NIT Campus were: Little Black Cormorant (10), Black-crowned Night Heron (24), Little Egret (13) and Western Cattle Egret (35). In riparian zones, Western Cattle Egret was the most dominant (39 nests), using mango tree (12 nests), cluster fig (10 nests), and royal poinciana (3 nests). Little Black Cormorant nested on mango tree (8 nests), ashoka tree (6 nests) and royal poinciana (2 nests). Total riparian nest counts were: Little Black Cormorant (16), Black-crowned Night Heron (14), Little

Egret (6), Western Cattle Egret (39). The preference of different tree species by Little Black Cormorant (F=0.62, p=0.67), Little Egret (F=2.005, p=0.258) and Western Cattle Egret (F=1.34, p=0.391) was not statistically significant. On the other hand, the preference of different tree species by Black-crowned Night Heron was statistically significant (F=12.93, p=0.014). Multiple comparison and post-hoc test showed that Black-crowned Night Heron preferred the cluster fig most. Urban campuses favoured fig tree species for nesting due to dense canopies, while riparian zones supported fruit-bearing mango and flowering royal poinciana trees, likely enhanced by water proximity.

Table 2. Tree selection by herons in the study area. The abbreviations are as follows: BCNH = Black-crowned Night Heron, WCE = Western Cattle Egret, LBC = Little Black Cormorant LE = Little Egret

2. táblázat A gémfélék fafaj-szelekciója a vizsgálati területen. A rövidítések a következő fajokat jelölik: BCNH = bakcsó, WCE = pásztorgém, LBC = fekete kárókatona, LE = kis kócsag

Heron species	Location	Sacred fig	Cluster fig	Ashoka	Mango	Royal poinciana	Total Nests
LBC	NIT Campus	4	2	4	0	0	10
	Kali Ghat to Baharwa Ghat	0	0	6	8	2	16
BCNH	NIT Campus	8	12	4	0	0	24
	Kali Ghat to Baharwa Ghat	4	10	0	0	0	14
LE	NIT Campus	4	6	3	0	0	13
	Kali Ghat to Baharwa Ghat	2	0	4	0	0	6
WCE	NIT Campus	11	6	18	0	0	35
	Kali Ghat to Baharwa Ghat	6	10	8	12	3	39

Avian interactions with cotton tree

Interestingly, the cotton tree was found to be bustling with bird activities, supporting a diverse array of avian species for nesting, feeding, roosting, and perching.

Cotton tree is a highly preferred tree species for birds due to its suitability for: (1) nesting – strong branches and cavities suitable for different nest types; (2) food availability – nectar-rich flowers that attract a variety of species; (3) roosting and perching opportunities – tall structure provides a safe resting place *(Table 3)*.

Discussion

Higher species richness in urban academic campuses reflects diverse vegetation and lower anthropogenic disturbance compared to riparian zones, where intense human activity and population density likely reduce bird diversity (Seress & Liker 2015, Sanllorente *et al.* 2023). The campuses in India underwent human-induced habitat modification significantly less than their surrounding landscape in last one decade (Guthula *et al.* 2022). Cluster fig tree was preferred by herons. Urban nesting preferences for *Ficus* species stem from their structural suitability (Roshnath & Sinu 2017), while riparian zones' reliance on mango

Table 3. Birds' interactions with cotton tree
3. táblázat A madarak interakciója a gyapotfával

S.No.	Bird Behavior	Bird Species	Interaction Details
1	**Nesting**	Common Myna	Nest construction within the tree canopy
2		Black Kite	Nest construction on higher branches
3		Asian Pied Starling	Nest construction within tree crevices or canopy
4		House Crow	Nest construction in the upper canopy
5		Rose-ringed Parakeet	Nesting within pre-existing tree burrows/cavities
6	**Feeding/Roosting**	Common Goldenback Woodpecker	Nectar feeding on red flowers
7		Purple Sunbird	Nectar feeding on red flowers
8		Brown-headed Barbet	Feeding on fruits and roosting
9		Black-headed Oriole	Feeding on fruits and roosting
10		House Crow	Feeding and roosting
11		Rufous Treepie	Feeding on insects and fruits, roosting
12		Rose-ringed Parakeet	Feeding on flowers and fruits, roosting
13		Alexandrine Parakeet	Feeding on flowers and fruits, roosting
14		Jungle Babbler	Foraging for insects and roosting
15		Large-billed Crow	Feeding and roosting
16		Common Myna	Foraging for insects and fruits, roosting
17		Asian Pied Starling	Foraging for insects and fruits, roosting
18	**Perching**	Indian Grey Hornbill	Resting and surveillance
19		White-throated Kingfisher	Perching while hunting or resting
20		Black Kite	Perching while surveying for prey or resting
21		Greater Coucal	Resting within the foliage
22		Asian Koel	Perching and vocalizing
23		Black Drongo	Perching and vocalizing

tree and royal poinciana reflects water-associated resource availability (Keten *et al*. 2020). Colonial nesting birds preferentially select large, tall trees with a high Girth at Breast Height (GBH), which provides superior structural stability and wind resistance due to thick, strong branches capable of supporting numerous nests (Jabaraj *et al*. 2021, Katuwal *et al*. 2022).

Cotton tree was a keystone species across both habitats, supporting nesting, feeding (nectar-rich flowers), roosting, and perching for diverse species, including nectar-feeders and predators (e.g. Black Kites *Milvus migrans*). This indicates its ecological importance. Similar studies in China and Brazil, where cotton tree is an alien species, reported that it supports a number of nectar feeding birds (Corlett 2005, Wang *et al.* 2018, Silva *et al.* 2023). Another study in northeast India reported a similar finding where both birds and tree species

were benefitted because the birds feeding on nectar helped in pollination and dispersal of tree species as well (Khanduri & Kumar 2017). Previous research has highlighted the importance of specific tree characteristics in attracting diverse avian fauna (Mallick *et al.* 2025). For instance, canopy structure can influence nest site selection and predator avoidance (Cody 1985), while flowering trees can provide crucial nectar resources for certain bird guilds (Silva *et al.* 2020). The consistent use of cotton tree across habitats underscores its value for urban afforestation (Corlett 2005, Silva *et al.* 2023). These findings emphasize the need for urban planning to mitigate anthropogenic impacts on riparian zones and preserve campus green spaces for avian conservation.

References

Cody, M. L. 1985. Habitat Selection in Birds. – Academic Press, Gainesville

Corlett, R. T. 2005. Interactions between birds, fruit bats and exotic plants in urban Hong Kong, South China. – Urban Ecosystems 8(3): 275–283. DOI: 10.1007/s11252-005-3260-x

Gill, F., Donsker, D. & Rasmussen, P. (eds.) 2025. IOC World Bird List (v15.1). – www.worldbirdnames.org/new/; accessed 07/08/2025

Guthula, V. B., Shrotriya, S., Nigam, P., Goyal, S. P., Mohan, D. & Habib, B. 2022. Biodiversity significance of small habitat patches: More than half of Indian bird species are in academic campuses. – Landscape and Urban Planning 228(1780): 104552. DOI: 10.1016/j.landurbplan.2022.104552

Jabaraj, D. F. S., Pandian, M. & Gopi, G. V. 2021. Nest-site characteristics of an urban heronry at Ranipet Police Station, Tamil Nadu. – Indian Birds 17(1): 4–7.

Kang, W., Minor, E. S., Park, C. R. & Lee, D. 2015. Effects of habitat structure, human disturbance, and habitat connectivity on urban forest bird communities. – Urban Ecosystems 18(3): 857–870. DOI: 10.1007/s11252-014-0433-5

Katuwal, H. B., Sundar, K. S. G., Zhang, M., Rimal, B., Baral, H. S., Sharma, H. P., Ghimire, P., Hughes, A. C. & Quan, R. C. 2022. Factors affecting the breeding ecology of the globally threatened Lesser Adjutant *(Leptoptilos javanicus)* in agricultural landscapes of Nepal. – Avian Conservation and Ecology 17(2): 15. DOI: 10.5751/ACE-02235-170215

Keten, A., Eroglu, E., Kaya, S. & Anderson, J. T. 2020. Bird diversity along a riparian corridor in a moderate urban landscape. – Ecological Indicators 118: 106751. DOI: 10.1016/j.ecolind.2020.106751

Khanduri, V. P. & Kumar, K. S. 2017. Reproductive effort and success in *Bombax ceiba* L. in a tropical forest of Mizoram, Indo-Burma region of North-East India. – Revista Brasileira de Botanica 40(1): 157–166. DOI: 10.1007/s40415-016-0327-2

Mallick, R., Paul, P., Gupta, N. K., Mandal, S. & Aditya, G. 2025. Exploring the bird-tree relationship in urban streetscape: Implication for conservation. – Ecological Frontiers 45(1780): 5097. DOI: 10.1016/j.ecofro.2025.01.001

Matuoka, M. A., Benchimol, M., de Almeida-Rocha, J. M. & Morante-Filho, J. C. 2020. Effects of anthropogenic disturbances on bird functional diversity: A global meta-analysis. – Ecological Indicators 116: 106471. DOI: 10.1016/j.ecolind.2020.106471

Melles, S., Glenn, S. & Martin, K. 2003. Urban bird diversity and landscape complexity: Species-environment associations along a multiscale habitat gradient. – Conservation Ecology 7(1): 5.

Naiman, R. J., Decamps, H. & Pollock, M. 1993. The role of riparian corridors in Maintaining Regional biodiversity. – Ecological Applications 3(2): 209–212. DOI: 10.2307/1941822

Padilla, B. J. & Rodewald, A. D. 2015. Avian metapopulation dynamics in a fragmented urbanizing landscape. – Urban Ecosystems 18(1): 239–250. DOI: 10.1007/s11252-014-0390-z

Rao, S. & Koli, V. K. 2017. Edge effect of busy high traffic roads on the nest site selection of birds inside the city area: Guild response. – Transportation Research Part D: Transport and Environment 51: 94–101. DOI: 10.1016/j.trd.2016.12.013

Roshnath, R. & Sinu, P. A. 2017. Nesting tree characteristics of heronry birds of urban ecosystems in peninsular India: Implications for habitat management. – Current Zoology 63(6): 599–605. DOI: 10.1093/cz/zox006

Sanllorente, O., Ríos-Guisado, R., Izquierdo, L., Molina, J. L., Mourocq, E. & Ibáñez-Álamo, J. D. 2023. The importance of university campuses for the avian diversity of cities. – Urban Forestry and Urban Greening 86: 128038. DOI: 10.1016/j.ufug.2023.128038

Seress, G. & Liker, A. 2015. Habitat urbanization and its effects on birds. – Acta Zoologica Academiae Scientiarum Hungaricae 61(4): 373–408. DOI: 10.17109/AZH.61.4.373.2015

Silva, P. A., Cherutte, A. G., Gomes, A. C. S., Silva, L. L., Brito, L., Rodrigues, B. M. & Maruyama, P. K. 2023. The ecological role and potential impact of an alien tree highly attractive to native nectar-feeding birds in urban areas. – Urban Ecosystems 26(4): 1029–1040. DOI: 10.1007/s11252-023-01345-9

Silva, P. A., Silva, L. L. & Brito, L. 2020. Using bird-flower interactions to select native tree resources for urban afforestation: the case of *Erythrina velutina*. – Urban Forestry and Urban Greening 51(1): 126677. DOI: 10.1016/j.ufug.2020.126677

Singh, R., Tiwari, A. K., Kumar, S. & Singh, G. S. 2024. Avifaunal diversity in managed urban ecosystem: A case study of Banaras Hindu University, Varanasi. – Ecological Questions 35(3): 1–25. DOI: 10.12775/EQ.2024.038

Sun, C., Hassin, Y., Boonman, A., Shwartz, A. & Yovel, Y. 2024. Species and habitat specific changes in bird activity in an urban environment during Covid 19 lockdown. – ELife 12: RP88064. DOI: 10.7554/eLife.88064

Wang, S., Ho, Y. & Chu, L. M. 2018. Diet and feeding behavior of the critically endangered Yellow-crested Cockatoo *(Cacatua sulphurea)* in a nonnative urban environment. – Wilson Journal of Ornithology 130(3): 746–754. DOI: 10.1676/17-109.1