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## BIO-INDICATOR BIRD SPECIES IN SELECTED URBAN GREEN SPACES OF JHALAWAR DISTRICT, RAJASTHAN, INDIA

<sup>1</sup>Renu Meena, and <sup>2</sup>Fatima Sultana

<sup>1</sup>Department of Zoology J.D.B Govt. Girls College, Kota, Rajasthan

<sup>2</sup>Principal Govt. College Antah, Rajasthan

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### ABSTRACT

The present study was carried out to explore the most abundant bioindicator species of birds in urban areas of Jhalawar district. The study was carried out in selected urban gardens and government buildings. We observed 10 bird species are Pigeon, Laughing dove, House sparrow, Brahminy myna, Common myna, Brown rock chat, Oriental magpie robin, Indian robin, Jungle babbler, Rose ringed parakeet. These species are more dominant and present almost every study site. The order Passeriformes is most dominant with relative diversity index 79.6 the Jhalawar district needs to have better urban planning in future by providing green spaces in city centers as well as government buildings. So conservation measures of various avifaunal diversity can be lead.

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### INTRODUCTION

Increasing human population causes urbanization which leads the huge amount of habitat loss, urban areas may aid in conservation of biodiversity. Land use and land cover changes due to urbanization (Muller *et al.*, 2013). So that green parks and plantation in urban areas help the conservation of flora and fauna. Urban planning focus on maintaining high habitat heterogeneity in urban green areas to promote greater bird diversity (Nelson *et al.*, 2019). Natural vegetation such as large trees and a multilayered vegetation structure are important components for maintaining high bird diversity in urban green spaces (Sandstrom *et al.*, 2005). Birds can be a good indicator of environmental quality and often used as an indicator of habitat quality in urban areas (Parihandiet *al.*, 2022). Birds used to monitor environmental health and habitat destruction as bio-indicator (Gupta, 2022). Birds indicate the restoration and conservation of forest habitat (Roche *et al.*, 2012). Birds assess the healthy environment quality in urban green spaces with their tree cover and changes in urban settlement (Morelli *et al.*, 2021).

Bird's species is recognized among the most important indicators of the environmental status. They are threatened by different anthropogenic pressures such as human

disturbance, unsustainable activities, land conversion and unplanned construction and developments. Conservation of the species of birds is not possible unless we have a sound understanding of bird's species diversity of a region. Thus, there is a need to enlist the data and manage the habitat in consideration with various requirements of the fauna (Kumari *et al.*, 2021). Therefore, using birds as bioindicators is a function of properties of interest and resources available for ecological evaluation which promotes conservation of bird species for impending generation (Egwumah *et al.*, 2014). Urban green space is built to protect biodiversity and ultimately improve human well-being. In the future, urban green space should be regarded as one of the important components of urban sustainability. We should invest more effort in rational planning according to the construction strategies of different cities (Zhanget *al.*, 2022). City planners should focus on allocating green spaces within urban settings (Kaushik *et al.* 2022). Birds are effective in applications such as environmental quality and ecosystem integrity and restoration, and they are used as early warnings of environmental change and assessment of environmental and climate change (Mekonen, 2017). The bird diversity acts as bio indicators for urban pollution, deforestation, habitat fragmentation as well as, human interference in the ecological community (Bhowmick 2023). In this paper we aimed to assess the diversity of most indicator bird species in urban green spaces of Jhalawar district.

\*Corresponding author: **Renu Meena**

Research scholar Department of Zoology J.D.B. Govt. Girls College, Kota, Rajasthan

## MATERIALS AND METHOD

### Study area

For the ease of study, the habitat of Jhalawar city in the present study was categorized under two groups-

- Urban Green areas (UGS) – This includes the city parks, gardens, offices and government buildings.
- Human settlement area- These includes residential colonies, buildings, roads and constructed areas.

### Bird Species Survey

In each greenspace, we collected a number of data related to the richness and abundance of bird species. From January 2023 to February 2024, birds were observed and recorded during every season by means of point-counts with unlimited distance (Bibby et al. 2000). "Point-counts" are a common method for sampling bird species. Every site was surveyed for 10 minutes, and during the time all the birds observed or heard in the 50 m buffer was documented. They included the species of the bird, the number of the bird, the bird's behavior (perching, foraging, flying, etc), and their distance from the observer. All birds that were flying over the site but did not use the habitat in its course were not considered. Surveys were conducted in the morning hours between from 06:00 to 09:00, especially when birds are usually active and noisy (Narang et al., 2020). The sampling was conducted at each site three times within one season; the intervals between the visits were one week to take into account the temporal changes. Overall, 100 point-counts were covered during survey.

Birds were identified using field guides (Grimmett et al., 2011; Kazmierczak & van Perlo, 2014), Nikon binoculars (8x42), and photographs were taken by Nikon Coolpix 1000. The taxonomy and nomenclature followed the latest checklist of the

Ornithological Society of India (Praveen et al., 2020). For each species, the feeding guild (insectivore, frugivore, granivore, carnivore, omnivore) and habitat preference (open, scrub, woodland, wetland) were assigned based on literature (Ali & Ripley, 1987; Grimmett et al., 2011) and field observations.

### Ecological Roles and Services of Birds in Urban Ecosystems

Birds are versatile and have crucial functions in cities serving as sources of multiple goods and positive externalities for human and environmental health. These services can be classified into four main categories: As depicted in Table 1, the identified ES include provisioning, regulating, cultural, and supporting services. pollution, and predation from domestic cats, and accidents with structures and vehicles (Chace & Walsh, 2006; Loss et al., 2015; Klem, 2015). Some Bird species are shrinking in numbers in cities around the globe especially those that are dependent on native habitats and sensitive to the effects of urbanization (Sol et al., 2014; Silva et al., 2015; Aronson et al., 2014).

### Major Threats and Challenges Facing Urban Bird Populations

Due to urbanization and the clearance of native vegetation, the extent and integration of appropriate habitats are reduced, making fragmentation and loss of habitat major issues for urban birds (McKinney, 2002). Anthropogenic noise, intrusions and other activities like recreations, traffic, construction and management regime can lead to stress, displacement and poor foraging and breeding success of urban birds (Fernández-Juricic et al., 2005). Global warming is becoming a threat to the urban birds since the areas within the cities are comparatively warmer and have less water and green vegetation owing to heat island effect and reduction of vegetation cover (Hambly et al.,

**Table 1.** Ecological roles and services provided by birds in urban ecosystems.

Service Category	Ecological roles and services	Examples
Provisioning	Food production	Hunting, egg collecting
	Medicinal resources	Traditional medicines, biotechnology
Regulating	Pest control	Insectivore, rodent predation
	Seed dispersal	Plant regeneration, habitat connectivity
	Pollination	Flower visitation, pollen transfer
	Nutrient cycling	Excrement deposition, carcass scavenging
Cultural	Soil formation	Bioturbation, organic matter accumulation
	Air quality regulation	Particulate matter removal
	Recreation and ecotourism	Birdwatching, photography
	Education and research	Citizen science, academic studies
	Aesthetic inspiration	Art, music, literature
	Spiritual and religious values	Symbolism, totems, rituals
Supporting	Sense of place	Local identity, community cohesion
	Habitat creation	Nest building, cavity excavation
	Trophic dynamics	Prey for other species, scavenging
	Biodiversity maintenance	Species interactions, ecosystem resilience

2017). Birds can be killed by hitting structures in cities, getting electrocuted, or getting tangled in wires and other structures (Loss *et al.*, 2014). Another threat is ecological traps that occur when apparently suitable habitats in urban environment may be detrimental to birds' survival and reproduction (Isaksson, 2018).

### RESULT AND DISCUSSION

A total of 47 species were recorded at 100 points counts in various UGS and HSA. The different species of birds observed in urban areas are House Crow (*Corvus splendens*), House Sparrow (*Passer domesticus*), Asian Pied Starling (*Gracupica contra*), Jungle babbler (*Argya striata*), Common myna (*Acridotheres tristis*), Asian open bill stork (*Anastomus oscitans*), Black drongo (*Dicrurus macrocercus*), Pond heron (*Ardeolagrarii*), White breasted water hen (*Amaurornis phoenicurus*), Purple rumped sunbird (*Leptocomazeylonica*), Green bee-eater (*Merops orientalis*), Common kingfisher (*Alcedo atthis*), Asian koel (*Eudynamis scolopaceus*), Copper smith barbet (*Megalaima haemacephala*), Oriental magpie robin (*Copsychus saularis*), Shikra (*Alcipiter badius*), Black naped oriole (*Oriolus chinensis*), Spotted Dove (*Spilopelia chinensis*), Rufous treepie (*Dendrocitta vagabunda*), Common tailorbird (*Orthotomus sutorius*), Red vented bulbul (*Pycnonotus cafer*), and White breasted kingfisher (*Halcyon smyrnensis*). We only considered species that were observed in all sites and their numbers keep increasing and decreasing in response to environmental stresses. Here we explore common bird species as indicator of environmental health in UGS and HSA of Jhalawar city. We selected 10 species on account of their relatively high density and detectability. Relative diversity index of bird species belonging to different order have been calculated by using formula:

**Table 2.** showing the orders and families of indicator bird species

S.No	Order of bird species	Family and bird species name	RD <sub>i</sub>
1	Columbiformes	Columbidae Pigeon, Laughing Dove	44.68
2	Passeriformes	Passeridae House sparrow Sturnidae Brahminy Myna, Common myna Muscicapidae Brown rock chat, Oriental Magpie robin, Indian robin Leiothrichidae Jungle babbler	79.6
3	Podicipediformes	Podicipedidae Rose ringed parakeet	38.29

The present study result revealed that 10 bird species belonging to 3 orders and 6 families which were observed during all season. Their numbers increase and decrease due to environmental stresses and anthropogenic activities. Due to richness of these bird species we studied them as bioindicator species. Order Passeriformes is dominant in bird species as it has highest relative diversity index. There is necessity to

conserve bird species to maintain healthy environment so green spaces should provide during urban park settlement. Human settlement area also with green road sides, green roof tops and aviary should be built in parks and Government

**Table 3.** showing list of ten most bioindicator birds in UGS of Jhalawar district

Common name	Scientific Name	IUCN status	Residential status	Relative abundance	Feeding guild
Brahminy starling	<i>Sturniapagodanum</i>	LC	R	CO	G
Brown rock chat	<i>Cercomelafusca</i>	LC	R	CO	I
Common myna	<i>Acridotheres tristis</i>	LC	R	VC	G
House sparrow	<i>Passer domesticus</i>	LC	R	VC	G
Indian robin	<i>Saxicoloides fulicatus</i>	LC	R	CO	I
Jungle babbler	<i>Turdoides striata</i>	LC	R	UC	O
Laughing dove	<i>Spilopelia senegalensis</i>	LC	R	VC	G
Oriental magpie robin	<i>Copsychus saularis</i>	LC	R	CO	I
Pigeon	<i>Columba livia</i>	LC	R	CO	G
Rose ringed parakeet	<i>Psittacula krameri</i>	LC	R	CO	F

institutes.

The present study revealed that UGS and HSA support the avifaunal diversity in Jhalawar district. Chauhan *et al.* 2018 studied on avifaunal diversity of Jhalawar forest division and found 181 bird species belonging to 22 orders and 65 families. This study focuses on ten most bioindicator bird species in Jhalawar district. All the ten bird species were placed in least concern category (Table 2), all birds are residential, 6 birds are with common (CO) relative abundance, 3 are very common (VC) and one is uncommon (UC). Feeding guilds of birds were recorded, that 5 are granivorous, 1 omnivorous, 1 frugivorous, and 3 are insectivorous.

### CONCLUSION

The present study result revealed that 10 bird species belonging to 3 orders and 6 families which are considered as bioindicator species as their availability in all study areas. The different urban areas support various species of birds so they are important habitats. These bioindicator birds are tolerant species and are susceptible to the environmental changes such as air pollution, noise pollution, and artificial night light.

Instead of this urban bird diversity is also facing anthropogenic threat. So that conservation measure of bird diversity should be undertaken to maintain proper habitats for birds by following suitable urban planning and development of city parks.

## References

1. Isaksson, C. (2018). Impact of urbanization on birds. In *Bird species* (pp. 235-257). Springer, Cham. [https://doi.org/10.1007/978-3-319-91689-7\\_13](https://doi.org/10.1007/978-3-319-91689-7_13)
2. McKinney, M. L. (2006). Urbanization as a major cause of biotic homogenization. *Biological Conservation*, 127(3), 247-260. <https://doi.org/10.1016/j.biocon.2005.09.005>
3. Narang, M. L., Rana, R. S., & Prabhakar, S. V. R. K. (2020). Birds of Chandigarh. Chandigarh Bird Club. [17.]
4. Chace, J. F., & Walsh, J. J. (2006). Urban effects on native avifauna: a review. *Landscape and Urban Planning*, 74(1), 46-69. <https://doi.org/10.1016/j.landurbplan.2004.08.007>
5. Fernández-Juricic, E. (2000). Bird community composition patterns in urban parks of Madrid: the role of age, size and isolation. *Ecological Research*, 15(4), 373-383. <https://doi.org/10.1046/j.1440-1703.2000.00358.x>
6. Grimmett, R., Inskipp, C., & Inskipp, T. (2011). *Birds of the Indian Subcontinent*. Bloomsbury Publishing.
7. Gupta, N., & Fartyal, R. S. (2019). Biodiversity of urban avifauna in Dehradun valley of the Himalayan foothills: conservation and management perspective. In *Advances in Fish and Wildlife Ecology and Biology* (pp. 69-83). Springer, Cham
8. Sandström, U. G., Angelstam, P., & Mikusiński, G. (2006). Ecological diversity of birds in relation to the structure of urban green space. *Landscape and Urban Planning*, 77(1-2), 39-53. <https://doi.org/10.1016/j.landurbplan.2005.01.004>
9. Sol, D., González-Lagos, C., Moreira, D., Maspons, J., & Lapiedra, O. (2014). Urbanisation tolerance and the loss of avian diversity. *Ecology Letters*, 17(8), 942-950. <https://doi.org/10.1111/ele.12297>
10. Silva, C. P., García, C. E., Estay, S. A., & Barbosa, O. (2015). Bird richness and abundance in response to urban form in a Latin American city: Valdivia, Chile as a case study. *PLoS One*, 10(9), e0138120. <https://doi.org/10.1371/journal.pone.0138120>
11. Muller, C. L., Chapman, L., Grimmond, C., Young, D. T., & Cai, X. (2013). Toward a standardized metadata protocol for urban meteorological networks. *Bulletin of the American Meteorological Society*, 94(8), 1161-1185. <https://doi.org/10.1175/bams-d-12-00096.1>
12. Nelson, R., Warnier, M., & Verma, T. (2024). Conceptualizing Urban Inequalities as a Complex Socio Technical Phenomenon. *Geographical Analysis*, 56(2), 187-216.
13. Mekonen, S. (2017). Birds as biodiversity and environmental indicator. *Indicator*, 7(21).
14. Roche, L. M., Rice, K. J., & Tate, K. W. (2012). Oak conservation maintains native grass stands in an oak woodland-annual grassland system. *Biodiversity and Conservation*, 21, 2555-2568.
15. Morelli, F., Benedetti, Y., Ibáñez-Álamo, J. D., Tryjanowski, P., Jokimäki, J., Kaisanlahti-Jokimäki, M. L., & Reif, J. (2021). Effects of urbanization on taxonomic, functional and phylogenetic avian diversity in Europe. *Science of the Total Environment*, 795, 148874.
16. Kumari, B., Kumari, P., Kumari, K., & Kumari, A. (2021). Biomonitoring of bird's species diversity of a college campus to assess the healthy ecosystem. *International Journal of Recent Scientific Research*, 12(06), 42092-42096.
17. Egwumah, F. A., Joy, E. A., & Po, E. (2014). Risk Assessment Indices for Heavy Metals Contaminated Wildlife Habitat. *Education*, 2018.
18. Ma, Y., Zhang, P., Zhao, K., Zhou, Y., & Zhao, S. (2022). A dynamic performance and differentiation management policy for urban construction land use change in Gansu, China. *Land*, 11(6), 942
19. Kaushik, M., Tiwari, S., & Manisha, K. (2022). Habitat patch size and tree species richness shape the bird community in urban green spaces of rapidly urbanizing Himalayan foothill region of India. *Urban Ecosystems*, 25(2), 423-436.
20. Bhowmick, S., & Chatterjee, D. (2023). Reimagining Urban Infrastructure for G20: India's Mission LiFE for Sustainable Cities. *Environment and Urbanization ASIA*, 14(2), 309-317.
21. Dawson, T., Hambly, J., & Graham, E. (2017). A central role for communities: Climate change and coastal heritage management in Scotland. *Public archaeology and climate change*, 23-33.

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