*Journal of Wildlife and Ecology*. (2018). 2(2):27-36

**Research Paper** **Open Access**

# Diversity of birds in rural and urban habitats of district Sargodha, Pakistan

**Sana Ashraf[1*], Saima Kanwal[1], Muhammad Sultan Haider[1] and Muhammad Altaf[2]**

1. Department of Zoology, University of Lahore, Sargodha campus, Sargodha, Pakistan
2. Department of Zoology, Women University of Azad Jammu and Kashmir, Bagh, Pakistan

***Corresponding Author**: sanaashrafdr@gmail.com

**Peer Reviewed**

**Citation**: Ashraf, S., S. Kanwal, M.S. Haider, M. Altaf. 2018. Diversity of birds in rural and urban habitats of district Sargodha, Pakistan. Journal of Wildlife and Ecology. 2: 26-36.

**Received**: 15, 03, 2018
**Accepted**: 11, 05, 2018
**Published**: 01, 06, 2018

**Competing interests**: The authors have declared that no competing interests exist.

**Funding**: Authors have no source of funding for this work.

## ABSTRACT

***Introduction:*** Birds are easily observable and are good ecological indicators. The decrease in the species habitats is main cause of many avian species decline, while some species of birds like to live in the vicinity of the human settled areas. The objectives of this study were to determine the diversity of avian fauna in rural and urban areas of district Sargodha.

***Materials and Methods:*** Data was collected at dawn and dusk times (from 6:00-9:00am and from 4:00- 6:00pm). The avian diversity of these study areas were conducted through point method of survey and by using the direct observations method with the help binoculars (10x50) and spotting scopes.

***Results:*** Throughout the year, 34 bird species were observed from the selected sites. A total of 3057 birds were calculated from all the sites. Dominance, Simpson diversity index, Shannon diversity index, Evenness and Richness of bird species were calculated as 0.1224, 0.1224, 0.8776, 2.444, 0.3387 and 4.112 respectively.

***Conclusion:*** Many species of the birds are declined in slightly and completely disturbed habitats, because they are not liked to live in the vicinity of the human populated areas and others are food and habitats specialist. They are avoided the polluted areas and also moved from climate change habitats.

**Key words:** Bird diversity, Evenness, Richness, Rural area, Abundance, Urban area.

## INTRODUCTION

Urban ecosystem study has been ignored with other ecosystems (Miller and Hobbs, 2002; Lugo, 2010; Kowarik, 2011; Perring *et al.*, 2013) till 1950s, while urban ecosystem study was started from 1960s (Ishitani *et al.*, 2003; Clergeau *et al.*, 2006; Musacchio, 2009; Bettencourt and Kaur, 2011; Wu, 2012; Wu, 2013). At that time urban ecosystem became challenge for all scientists (Miller and Hobbs, 2002). This was all reason of exponential growth in human population and created a negative impact on the birds (Bierwagen, 2007).

Birds were recorded almost all habitats (Roberts, 1991, 1992). Diversity and abundance of birds can change with change in elevation and climate, so they are very sensitive to environmental changes (Altaf *et al.*, 2018). Pakistan has 786 species of birds. In whole country a large variety of habitat with different topographical factors result this great biodiversity (Mirza and Wasiq, 2007). Bird's diversity is very essential due to its clarity and attraction to natural environment. Pakistan is showing a huge variety of bird's fauna due to its ideal location in biological realms and its diversity (Roberts, 1991, 1992; Grimmett, 1998).

Birds are easily observable and are good ecological indicators. By increasing urban development, the avian population has been changed. In relation to ecological indicators, bird's abundance and distribution were investigated. In urban areas, not only the ecological factors but industrial agents and the behavior of human beings also affect the ecological processes (Myers, 1990; Bibby, 1999; Myers *et al.*, 2000; Altaf *et al.*, 2012). Urbanization shows many environmental difficulties such as loss of biodiversity (Grimmett, 1998). The decrease in the species habitat is due to the factors like urbanization, all the types of pollutions, land escape changes, elimination and migration of species. The rubbish and sewage also has bad effect on the

avian species (Roberts, 1991, 1992). The objectives of this study were to determine the diversity of avian fauna in rural and urban areas of district Sargodha.

## MATERIALS AND METHODS

The present study was carried out at different rural and urban areas of Sargodha district from October 2015 to September 2016. The survey was carried out two times in a day (in early morning from 7:00 to 9:00 am and late afternoon from 4:00 to 6:00 pm) once in a month at every site. Data on ecology and distribution of birds was collected from the selected sites on monthly basis. Study area consists of 4 rural and 4 urban study sites in district Sargodha.

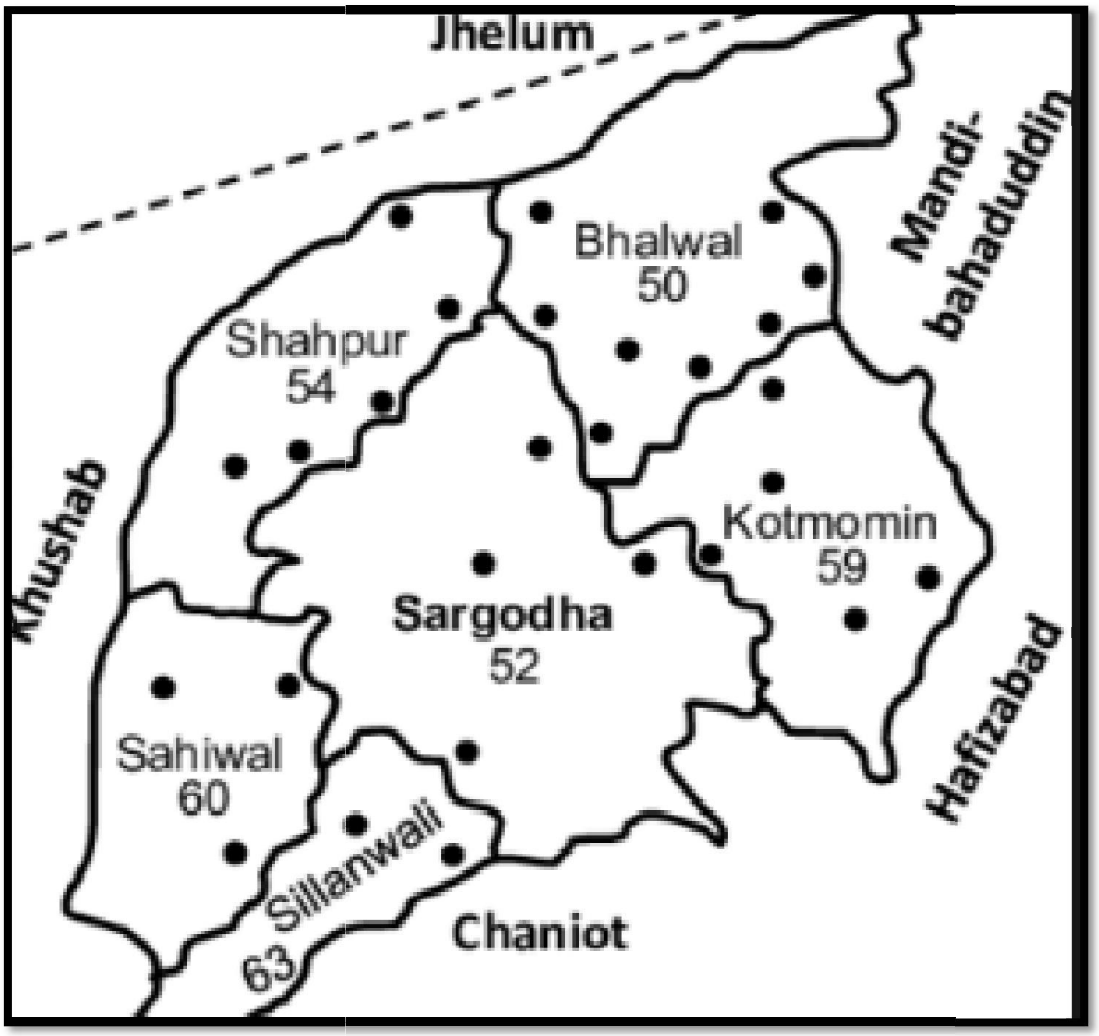


**Figure 1: Map of the study area.**

***Methodology:*** The avian diversity of these study areas were conducted through point method of survey and by using the direct (observations) method with binoculars (10x50) and spotting scopes of different magnifications. Identification of birds was done with the help of field guides and books (Roberts, 1991, 1992; Grimmett, 1998). At these selected sites, the relative abundance of bird species was calculated by point count method. At each site, different points were selected randomly for observation.

***Statistical analysis:*** The Diversity Indices were calculated with the help of the Past software (3 Version).

## RESULTS AND DISCUSSION

Throughout the year, 34 bird species were observed from the selected sites. A total of 3057 birds were calculated from all the sites (Table 1 and 2). Dominance, Simpson diversity index, Shannon diversity index, Evenness and Richness of bird species were calculated as 0.1224, 0.1224, 0.8776, 2.444, 0.3387 and 4.112 respectively (Table 2). Altaf recorded 41 species from the rural and urban habitats of Gujranwala (Altaf *et al.*, 2012).

Urbanization have different impact on the different birds, some bird species are increased in numbers while other are decreased (Altaf *et al.*, 2018). Urbanization favors omnivores, granivores, aerial and ground foraging insectivores (Emlen, 1974) and resident's bird's species are dominant over migrant's birds (Poague *et al.*, 2000; Garaffa *et al.*, 2009), while specialist bird are more negatively affected by urbanization (Faulkner, 2004). Altaf *et al.* (2018) noted that the habitat preferences of birds different significantly. A decline in avian diversity was noted from forest to urban landscapes. Garbage in urban core has food for avian species, which was produced by carnivorous and omnivorous mammalian species especially human waste material (Boadi and Kuitunen, 2002; Shwartz *et al.*, 2008).

Urbanization provides better feed for birds e.g. omnivores, granivores, insectivores and nectivores (hummingbirds, jays, chickadees, nuthatches, woodpeckers, juncos, finches, sparrow and grosbeaks) get food from the vegetation, residents dominant than migrants (Poague et al., 2000), while scavenging and omnivores (e.g. gulls, jays, ravens, blackbirds, crows and European starlings) get food from the spilled waste (Boadi and Kuitunen, 2002; Shwartz *et al.*, 2008). Food resources are affected by changes in plant diversity, exotic vegetation has fewer insects than native vegetation and urban lawns have high feeding grounds (Parsons *et al.*, 2006), these changes favor ground foragers and granivores. Previous research indicated that specialist's species of birds were more negatively affected by urbanization. Indeed, generalist species of birds have better colonizing abilities and to better manage with urban and agricultural disturbance (Fernández-Juricic, 2004; Devictor *et al.*, 2008a; Devictor *et al.*, 2008b).

**Table 1: summary of birds at rural and urban areas of Sargodha.**

| Sr. | **Common Name** | ***Scientific name*** | **Population** |
|---|---|---|---|
| 1 | House crow | *Corvus splendens* | 595 |
| 2 | House sparrow | *Passer domesticus* | 455 |
| 3 | Red-vented bulbul | *Pycnonotus cafer* | 48 |
| 4 | Common myna | *Acridotheres tristis* | 576 |
| 5 | Common hoopoe | *Upupa epops* | 48 |
| 6 | Brown rock chat | *Cercomela fusca* | 5 |
| 7 | Black drongo | *Dicrurus macrocercus* | 5 |
| 8 | Cattle egret | *Bubulcus ibis* | 46 |
| 9 | Red-wattled lapwing | *Vanellus indicus* | 8 |
| 10 | Common cuckoo | *Cuculus canorus* | 2 |
| 11 | Eurasian collared dove | *Streptopelia decaocto* | 8 |
| 12 | Black-winged stilt | *Himantopus himantopus* | 35 |
| 13 | White wagtail | *Motacilla alba* | 120 |
| 14 | Rock pigeon | *Columba livia* | 96 |
| 15 | White browed wagtail | *Motacilla maderaspatensis* | 110 |
| 16 | Purple sunbird | *Nectarinia asiatica* | 12 |
| 17 | Little egret | *Egretta grazetta* | 360 |
| 18 | Temminck's stint | *Calidris temminckii* | 8 |

| | | | |
|---|---|---|---|
| 19 | Little stint | *Calidris minutus* | 6 |
| 20 | Common moorhen | *Gallinula chloropus* | 17 |
| 21 | Greater coucal | *Centropus sinensis* | 5 |
| 22 | White throated kingfisher | *Halcyon smyrnesis* | 2 |
| 23 | Indian Sand Marin | *Riparia paludicula* | 55 |
| 24 | Crested lark | *Galerida cristata* | 8 |
| 25 | Bank myna | *Acridotheres ginginianus* | 240 |
| 26 | Black kite | *Milvus migrans* | 120 |
| 27 | Spotted owlet | *Athene brama* | 2 |
| 28 | Pied bushchat | *Saxicola caprata* | 2 |
| 29 | Indian Roller | *Coracias benghalensis* | 2 |
| 30 | Indian pond heron | *Ardeola grayii* | 46 |
| 31 | Alexandrine parakeet | *Psittacula eupatria* | 2 |
| 32 | Sind sparrow | *Passer pyrrhonotus* | 2 |
| 33 | Red avadavat | *Amandava amandava* | 4 |
| 34 | Little green bee-eater | *Merops orientalis* | 7 |

**Table 2: Statistical analysis of the study area.**

| **Diversity Indices** | **Value** |
|---|---|
| Species | 34 |
| Population | 3057 |
| Dominance | 0.1224 |
| Simpson diversity index | 0.8776 |
| Shannon diversity index | 2.444 |
| Evenness | 0.3387 |
| Margalef/Richness | 4.112 |

***Conclusion:*** Many species of the birds are declined in slightly and completely disturbed habitats, because they are not liked to live in the vicinity of the human populated areas and others are food and habitats specialist. They are avoided the polluted areas and also moved from climate change habitats.

***Recommendations:*** Many recommendations are necessary for this study. Parks, gardens and agricultural areas should be enhanced in urban areas for the attraction of bird species.

Deforestation should be controlled. Pollution must be controlled in urban areas. Many feeding sites should be made for bird species to attract the local and migrated bird species. Local bird species should be protected to create the awareness among people. Awareness about birds should be increased among public.

***Availability of data:*** We have included all relevant data in the manuscript that were collected during the field survey.

***Authors' contributions:*** Ashraf designed this study and Kanwal performed the research and data write up; Haider and Altaf is critically analyzed article and approved as final manuscript.

## REFERENCES

Altaf, M., A. Javid, A.M. Khan, M. Khan, M. Umair, Z. Ali. 2018. Anthropogenic impact on the distribution of the birds in the tropical thorn forest, Punjab, Pakistan. Journal of Asia-Pacific Biodiversity. 11: 229-236.

Altaf, M., A.M. Khan, M. Umair, Irfan, M.A. Munir. 2012. Status of wild birds and mammals in urban habitats of Gujranwala, Punjab, Pakistan. Punjab University Journal of Zoology. 27 9-12.

Bettencourt, L.M., J. Kaur. 2011. Evolution and structure of sustainability science. Proceedings of the National Academy of Sciences. 108: 19540-19545.

Bibby, C.J. 1999. Making the most of birds as environmental indicators. Ostrich. 70: 81-88.

Bierwagen, B.G. 2007. Connectivity in urbanizing landscapes: The importance of habitat configuration, urban area size, and dispersal. Urban ecosystems. 10: 29-42.

Boadi, K.O., M. Kuitunen. 2002. Urban waste pollution in the Korle lagoon, Accra, Ghana. Environmentalist. 22: 301-309.

Clergeau, P., J. Jokimäki, R. Snep. 2006. Using hierarchical levels for urban ecology. Trends in ecology & evolution. 21: 660-661.

Devictor, V., R. Julliard, J. Clavel, F. Jiguet, A. Lee, D. Couvet. 2008a. Functional biotic homogenization of bird communities in disturbed landscapes. Global Ecology and Biogeography. 17: 252-261.

Devictor, V., R. Julliard, F. Jiguet. 2008b. Distribution of specialist and generalist species along spatial gradients of habitat disturbance and fragmentation. Oikos. 117: 507-514.

Emlen, J.T. 1974. An urban bird community in Tucson, Arizona: derivation, structure, regulation. Condor. 184-197.

Faulkner, S. 2004. Urbanization impacts on the structure and function of forested wetlands. Urban ecosystems. 7: 89-106.

Fernández-Juricic, E. 2004. Spatial and temporal analysis of the distribution of forest specialists in an urban-fragmented landscape (Madrid, Spain): implications for local and regional bird conservation. Landscape and urban planning. 69: 17-32.

Garaffa, P.I., J. Filloy, M.I. Bellocq. 2009. Bird community responses along urban–rural gradients: Does the size of the urbanized area matter? Landscape and urban planning. 90: 33-41.

Grimmett, R., Inskipp, C. & Inskip, T. 1998. Birds of the Indian subcontinent. Christopher Helm an imprint of A and C Black (Publisher) Ltd, 35 Bedford Row, London WCIR 4JH.

Ishitani, M., D. Kotze, J. Niemelä. 2003. Changes in carabid beetle assemblages across an urban-rural gradient in Japan. Ecography. 26: 481-489.

Kowarik, I. 2011. Novel urban ecosystems, biodiversity, and conservation. Environmental Pollution. 159: 1974-1983.

Lugo, A.E. 2010. Let's not forget the biodiversity of the cities. Biotropica. 42: 576-577.

Miller, J.R., R.J. Hobbs. 2002. Conservation where people live and work. Conservation Biology. 16: 330-337.

Mirza, Z.B., H. Wasiq. 2007. A field guide to birds of Pakistan Bookland, Lahore.

Musacchio, L.R. 2009. The scientific basis for the design of landscape sustainability: a conceptual framework for translational landscape research and practice of designed landscapes and the six Es of landscape sustainability. Landscape Ecology. 24: 993-1013.

Myers, J.H., D. Simberloff, A.M. Kuris, J.R. Carey. 2000. Eradication revisited: dealing with exotic species. Trends in Ecology & Evolution. 15: 316-320.

Myers, N. 1990. The biodiversity challenge: expanded hot-spots analysis. Environmentalist. 10: 243-256.

Parsons, H., R.E. Major, K. French. 2006. Species interactions and habitat associations of birds inhabiting urban areas of Sydney, Australia. Austral Ecology. 31: 217-227.

Perring, M.P., P. Manning, R.J. Hobbs, A.E. Lugo, C.E. Ramalho, R.J. Standish. 2013. Novel urban ecosystems and ecosystem services. Novel ecosystems: intervening in the new ecological world order. 310-325.

Poague, K.L., R.J. Johnson, L.J. Young. 2000. Bird use of rural and urban converted railroad rights-of-way in southeast Nebraska. Wildlife Society Bulletin. 852-864.

Roberts, T.J. 1991. The Birds of Pakistan Oxford University Press. Karachi

Roberts, T.J. 1992. The Birds of Pakistan. Oxford University Press. Karachi.

Shwartz, A., S. Shirley, S. Kark. 2008. How do habitat variability and management regime shape the spatial heterogeneity of birds within a large Mediterranean urban park? Landscape and urban planning. 84: 219-229.

Wu, J. 2013. Landscape sustainability science: ecosystem services and human well-being in changing landscapes. Landscape Ecology. 28: 999-1023.

Wu, J.J. 2012. A landscape approach for sustainability science Sustainability Science. p 59-77. Springer.