

Diversity and Ecology of Birds from selected Sites of Islamabad, Pakistan

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SUMMARY

Pakistan is home to an impressive diversity of bird species, owing to its unique position at the intersection of the Palearctic, Oriental, and Ethiopian zoogeographic regions. This blend of biogeographical influences, along with the country's extensive range of ecosystems such as mountainous areas, coastal regions, river systems, deserts, wetlands, and farmlands results in a rich avian diversity, with more than 668 species documented. The main objectives of this research were assessing bird diversity, richness and abundance, among these habitats in Islamabad; evaluating new distribution of birds; and analysis of threats to avian species among these habitats. Data were collected from January, 2018 to December, 2024 from Margalla Hill Nation Park, Rawal Lake, Quaid e Azam University and Fatima Jinah Park, Islamabad. Data collection involved both direct field surveys and secondary information gathered from local stakeholders, including hunters, wildlife photographers, and subject experts. The diversity evaluation of the study region documented 230 avian species belongs to 149 Genera, 63 families and 17 orders. The study area shows a high diversity of avian life, some of which are dominant in this avian landscape. Notably, 23 new bird species were discovered in the region.

Keywords: Birds, Diversity, Islamabad, National Park, Urban, Lake

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INTRODUCTION

Pakistan has a diverse range of bird species due to its location at the crossroads of the Palearctic, Oriental, and Ethiopian zoogeographic regions. This blend of biogeographical influences, along with the country's extensive range of ecosystems such as mountainous areas, coastal regions, river systems, deserts, wetlands, and farmlands results in a rich avian diversity, with more than 668 species documented

(Roberts, 1991, 1992; Mirza and Wasiq, 2007; Grimm et al., 2008; Mirza, 2012). In bird ecology and conservation, the diversity component pertains to the range of bird species present in a particular habitat or area (Altaf, 2010; Altaf et al., 2018), which includes elements like species richness (the count of distinct species), evenness (the proportional abundance of each species), and functional diversity (the contributions birds make to ecosystems) (Ali et al., 2016; Altaf, 2016). Grasping these elements is essential for evaluating ecosystem health, as birds frequently serve as indicators of environmental shifts. High avian diversity is a sign of a stable and resilient ecosystem, characterized by abundant habitats and complex ecological interactions (Ali and Akhtar, 2005; Rasool et al., 2023). It indicates the availability of diverse food resources, variations in climate, and heterogeneous habitats that support numerous species with distinct ecological roles (Kazam et al., 2024). Greater species richness and genetic diversity contribute to ecosystem stability by enhancing adaptability to environmental changes, lowering the risk of species extinction, and ensuring functional redundancy, where multiple species fulfill similar ecological functions (Altaf, 2016; Rahman et al., 2021; Rahman et al., 2023).

Currently, high population lives in cities, leading to rapid development in metropolitan and suburban areas (Buhaug and Urdal, 2013). However, this urbanization often results in negative consequences, particularly the detrimental impact on biodiversity, as many cities are built in the regions rich in biodiversity. While some individuals recognize the importance of urban and peri-urban biodiversity however, a comprehensive synthesis of this topic is lacking, especially in developing countries where understanding of the issue is less advanced (Rodrigues et al., 2018; Ali et al., 2020). The reason for taking Islamabad as a focus area in this study is because of its planned location in Pakistan and its proximity to the Margalla Hills that have a wide range of ecosystems from forests to water reservoirs and urban landscape. The main objectives of the research are; assessing bird diversity, richness and abundance, in Islamabad, evaluating new distribution of birds, and analysis of threats to the avian species among these habitats.

MATERIALS AND METHODS

STUDY AREA

Islamabad is the capital city of Pakistan and located at 33.43°N 73.04°E. Established in 1967 as a planned city, Islamabad replaced Karachi as Pakistan's national capital. Islamabad is located northern extremity of the Pothohar Plateau, which merges with the Margalla Hills in the Islamabad Capital Territory. The city is at an elevation of 540 m. To the northeast lies the hill station of Murree, a relic from colonial times, while north of Islamabad lie the Haripur District in KPK. Kahuta, Taxila, Wah Cantt, Attock, Gujar Khan, Rawat, and Mandurah are neighbor cities. The city covers an area of 906 square kilometers; an additional 2,717 square kilometers is delineated as the specified area, bordered by the Margalla Hills. The southern part of Islamabad is mainly comprised of plains drained by the Kurang River, which harbors the Rawal Dam (Aslam et al., 2021; Hasan et al., 2022).

Islamabad has a humid subtropical climate with five distinct seasons: winter (November–February), spring (March and April), summer (May and June), rainy

monsoon (July and August), and autumn (September and October). June is the warmest month, with typical high temperatures exceeding 38 °C. July is the rainiest month, bringing significant rainfall and evening thunderstorms, along with the risk of sudden heavy rain and flooding. January is the coldest month (Khan et al., 2025).

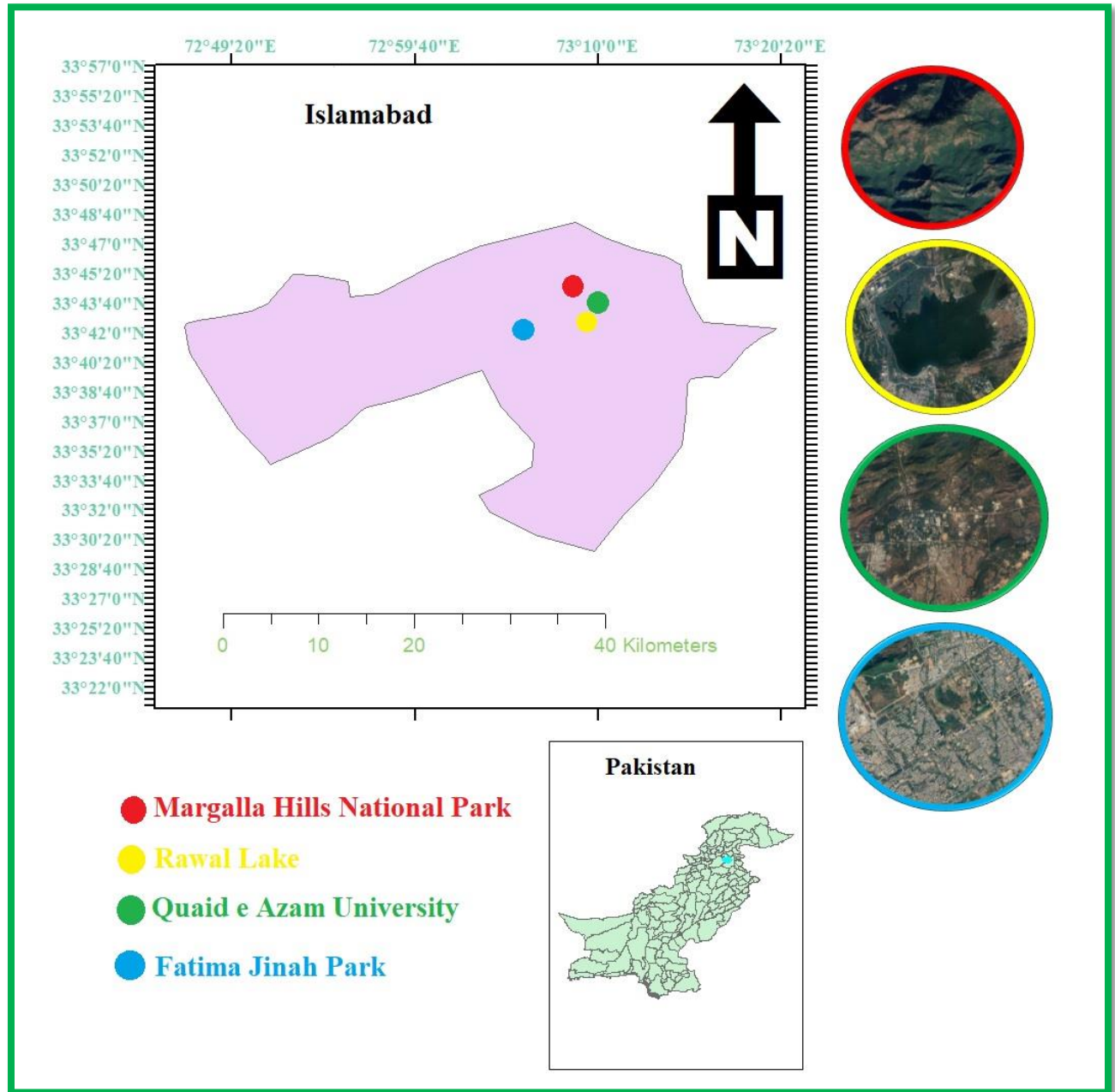


Figure 1: Map of Islamabad.

METHODOLOGY

Data were collected from January, 2018 to December, 2024 from Margalla Hills National Park, Rawal Lake, Quaid e Azam University and Fatima Jinah Park,

Islamabad (Figure 1). The avian species were identified with the help of several field guides (Roberts, 1991, 1992; Grimmett et al., 2016; Mirza, 2012).

Data Collection

The research region was divided into five primary habitat categories, including the urban environments of Islamabad, Margalla Hills National Park, Lake View Park, and Urban areas. These locations were chosen due to their ecological importance, habitat diversity, and human impacts. Margalla Hills National Park demonstrates a safeguarded mountainous ecosystem with diverse biological life, whereas urban regions and Lake View Park exhibit extensively altered environments impacted by growing human development (Figure 1). The selection of these sites is based on their ecological significance and their vulnerability to a range of environmental pressures, such as habitat fragmentation, pollution, tourism, and encroachment. Data collection involved both direct field surveys and secondary information gathered from local stakeholders, including hunters, wildlife photographers, and wildlife experts.

Statistical Analysis

For Relative abundance heat-map-plots were generated on R studio by using the packages and OriginPro (2023b) and for statistical analysis Past Statistical software (5.1) was used.

RESULTS AND DISCUSSION

The diversity evaluation of the study region documented 230 avian species (Figure 2) (i.e. *Aquila fasciata*, *Aquila nipalensis*, *Aquila rapax*, *Accipiter badius*, *Accipiter nisus*, *Butastur teesa*, *Buteo buteo*, *Buteo rufinus*, *Circus aeruginosus*, *Elanus caeruleus*, *Gyps fulvus*, *Gyps himalayensis*, *Pernis ptilorhynchus*, *Spilornis cheela*, *Pandion haliaetus*, *Aythya fuligula*, *Mareca Penelope*, *Netta rufina*, *Spatula clypeata*, *Spatula querquedula*, *Upupa epops*, *Charadrius dubius*, *Charadrius hiaticula*, *Vanellus indicus*, *Vanellus vanellus*, *Chroicocephalus ridibundus*, *Ichthyaelus ichthyaelus*, *Actitis hypoleucos*, *Calidris minuta*, *Calidris pugnax*, *Calidris temminckii*, *Charadrius alexandrinus*, *Scolopax rusticola*, *Tringa nebularia*, *Tringa ochropus*, *Ciconia nigra*, *Spilopelia chinensis*, *Spilopelia senegalensis*, *Streptopelia decaocto*, *Streptopelia orientalis*, *Treron phoenicopterus*, *Alcedo atthis*, *Ceryle rudis*, *Halcyon smyrnensis*, *Megaceryle lugubris*, *Coracias benghalensis*, *Merops orientalis*, *Merops philippinus*, *Clamator jacobinus*, *Cuculus canorus*, *Eudynamis scolopacea*, *Hierococcyx varius*, *Taccocua leschenaultia*, *Falco peregrinus*, *Falco tinnunculus*, *Francolinus pondicerianus*, *Lophura leucomelanos*, *Francolinus francolinus*, *Amaurornis phoenicurus*, *Gallinula chloropus*, *Grus virgo*, *Porphyrio poliocephalus*, *Acrocephalus dumetorum*, *Acrocephalus stentoreus*, *Aegithalos concinnus*, *Aegithalos leucogenys*, *Galerida cristata*, *Mirafra erythroptera*, *Ardea alba*, *Ardea cinerea*, *Ardea purpurea*, *Ardeola grayii*, *Egretta garzetta*, *Ixobrychus flavicollis*, *Nycticorax nycticorax*, *Pericrocotus ethologus*, *Certhia familiaris*, *Certhia himalayana*, *Cettia brunnifrons*, *Horornis fortipes*, *Cisticola juncidis*, *Orthotomus sutorius*, *Prinia inornata*, *Prinia buehneri*, *Prinia flaviventris*, *Prinia hodgsonii*, *Prinia socialis*, *Garrulus glandarius*, *Corvus frugilegus*, *Dendrocitta formosae*,

Dendrocitta vagabunda, *Garrulus lanceolatus*, *Urocissa erythroryncha*, *Dicaeum agile*, *Dicrurus hottentottus*, *Dicrurus macrocercus*, *Emberiza bruniceps*, *Emberiza cia*, *Emberiza fucata*, *Emberiza lathami*, *Emberiza schoeniclus*, *Emberiza stewarti*, *Amandava amandava*, *Euodice malabarica*, *Lonchura punctulata*, *Carduelis carduelis*, *Carpodacus erythrurus*, *Carpodacus rodochora*, *Chloris spinoides*, *Serinus pusillus*, *Cecropis daurica*, *Hirundo rustica*, *Hirundo smithii*, *Petrochelidon fluvicola*, *Icterus nigrogularis*, *Lanius isabellinus*, *Lanius schach*, *Heterophasia capistrata*, *Leiothrix lutea*, *Trochalopteron lineatum*, *Trochalopteron variegatum*, *Turdoides earlei*, *Turdoides striata*, *Locustella naevia*, *Luscinia svecica*, *Monticola cinclorhyncha*, *Monticola rufiventris*, *Monticola solitaries*, *Muscicapa sibirica*, *Myophonus caeruleus*, *Niltava sundara*, *Oenanthe fusca*, *Oenanthe isabellina*, *Oenanthe picata*, *Phoenicurus caeruleocephal*, *Phoenicurus erythronotus*, *Phoenicurus fuliginosus*, *Saxicola caprata*, *Saxicola ferreus*, *Saxicola maurus*, *Saxicoloides fulicatus*, *Tarsiger chrysaeus*, *Tarsiger cyanurus*, *Tarsiger rufilatus*, *Terpsiphone paradise*, *Anthus roseatus*, *Anthus rufulus*, *Anthus similis*, *Anthus spinoletta*, *Anthus trivialis*, *Motacilla alba*, *Motacilla cinerea*, *Motacilla citreola*, *Motacilla flava*, *Calliope pectoralis*, *Chaimarrornis leucocephalus*, *Copsychus saularis*, *Cyornis rubeculoides*, *Enicurus maculatus*, *Erithacus rubecula*, *Eumyias thalassinus*, *Ficedula albicilla*, *Ficedula parva*, *Ficedula superciliaris*, *Ficedula tricolor*, *Aethopyga siparaja*, *Cinnyris asiaticus*, *Oriolus kundoo*, *Oriolus oriolus*, *Chrysomma sinense*, *Parus monticolus*, *Parus cinereus*, *Passer cinnamomeus*, *Passer domesticus*, *Passer hispaniolensis*, *Petronia xanthocollis*, *Phylloscopus chloronotus*, *Phylloscopus collybita*, *Phylloscopus griseolus*, *Phylloscopus humei*, *Phylloscopus whistleri*, *Phylloscopus xanthoschistos*, *Pitta brachyuran*, *Ploceus philippinus*, *Ploceus manyar*, *Prunella strophia*, *Prunella atrogularis*, *Hypsipetes leucocephalus*, *Pycnonotus cafer*, *Pycnonotus leucogenys*, *Rhipidura albicollis*, *Sitta cinnamoventris*, *Sitta leucopsis*, *Chelidorrhinus hypoxantha*, *Culicicapa ceylonensis*, *Acridotheres fuscus*, *Acridotheres ginginianus*, *Gracupica contra*, *Sturnia malabarica*, *Sturnia pagodarum*, *Sturnus vulgaris*, *Sylvia curruca*, *Tichodroma muraria*, *Cyanoderma pyrrhops*, *Pomatorhinus erythrogeus*, *Pomatorhinus horsfieldii*, *Troglodytes troglodytes*, *Geokichla citrine*, *Turdus atrogularis*, *Turdus boubol*, *Zosterops palpebrosus*, *Psilopogon asiaticus*, *Psilopogon haemacephalus*, *Psilopogon virens*, *Dendrocopos macei*, *Dendrocopos canicapillus*, *Dinopium benghalense*, *Jynx torquilla*, *Leiopicus auriceps*, *Picumnus innominatus*, *Picus squamatus*, *Tachybaptus ruficollis*, *Psittacula himalayana*, *Psittacula krameri*, *Athene brama*, *Bubo bengalensis*, *Glaucidium cuculoides*, *Otus bakkamoena*, *Microcarbo niger* and *Phalacrocorax carbo*) (Table 1), belongs to 149 Genera (Figure 3) (i.e. *Phylloscopus*, *Prinia*, *Emberiza*, *Anthus*, *Motacilla*, *Ardea*, *Ficedula*, *Aquila*, *Butastur*, *Calidris*, *Tringa*, *Acrocephalus*, *Certhia*, *Lanius*, *Monticola*, *Oenanthe*, *Phoenicurus*, *Saxicola*, *Tarsiger*, *Passer*, *Psilopogon*, *Accipiter*, *Gyps*, *Spatula*, *Charadrius dubius*, *Vanellus*, *Spilopelia*, *Streptopelia*, *Merops*, *Falco*, *Aegithalos*, *Dendrocitta*, *Urocissa*, *Carpodacus*, *Hirundo*, *Trochalopteron*, *Turdoides*, *Oriolus*, *Parus*, *Ploceus*, *Prunella*, *Pycnonotus*, *Rhipidura*, *Sitta*, *Acridotheres*, *Sturnia*, *Pomatorhinus*, *Turdus*, *Dendrocopos*, *Psittacula*, *Circus*, *Elanus*, *Pernis*, *Spilornis*, *Pandion*, *Aythya*, *Mareca*, *Netta*, *Upupa*, *Chroicocephalus*,

Ichthyaetus, Actitis, Charadrius, Scolopax, Ciconia, Treron, Alcedo, Ceryle, Halcyon, Megaceryle, Coracias, Clamator, Cuculus, Eudynamys, Hierococcyx, Taccocua, Francolinus, Pucrasia, Amaurornis, Gallinula, Grus, Porphyrio, Galerida, Mirafra, Egretta, Ixobrychus, Nycticorax, Pericrocotus, Horornis, Cisticola, Orthotomus, Corvus, Garrulus, Dicaeum, Dicrurus, Melophus, Amandava, Euodice, Lonchura, Carduelis, Chloris, Serinus, Cecropis, Petrochelidon, Icterus, Heterophasia, Leiothrix, Locustella, Luscinia, Muscicapa, Myophonus, Niltava, Saxicoloides, Terpsiphone, Calliope pectoralis, Chaimarrornis, Copsychus, Cyornis, Enicurus, Erithacus, Eumyias, Aethopyga, Cinnyris, Chrysomma, Petronia, Pitta, Hypsipetes, Chelidorhynch, Culicicapa, Gracupica, Sturnus, Sylvia, Tichodroma, Cyanoderma, Troglodytes, Geokichla, Zosterops, Dinopium, Jynx, Leiopicus, Picumnus, Picus, Tachybaptus, Athene, Bubo, Glaucidium, Otus, Microcarbo, Phalacrocorax and Pterorhinus), 63 families (Figure 4) (i.e. Monarchidae, Accipitridae, Muscicapidae, Motacillidae, Scolopacidae, Ardeidae, Cisticolidae, Picidae, Phylloscopidae, Emberizidae, Leiothrichidae, Sturnidae, Anatidae, Columbidae, Cuculidae, Corvidae, Fringillidae, Charadriidae, Alcedinidae, Rallidae, Hirundinidae, Passeridae, Strigidae, Phasianidae, Estrildidae, Pycnonotidae, Timaliidae, Turdidae, Megalaimidae, Podicipedidae, Acrocephalidae, Laniidae, Laridae, Meropidae, Falconidae, Aegithalidae, Alaudidae, Certhiidae, Cettiidae, Nectariniidae, Oriolidae, Paridae, Ploceidae, Prunellidae, Rhipiduridae, Sittidae, Stenostiridae, Phalacrocoracidae, Dicruridae, Pandionidae, Upupidae, Ciconiidae, Coraciidae, Campephagidae, Dicaeidae, Icteridae, Locustellidae, Paradoxornithidae, Pittidae, Sylviidae, Tichodromidae, Troglodytidae and Zosteropidae) and 17 orders (i.e. Passeriformes, Accipitriformes, Charadriiformes, Piciformes, Coraciiformes, Anseriformes, Columbiformes, Cuculiformes, Gruiformes, Strigiformes, Galliformes, Falconiformes, Psittaculiformes, Suliformes, Bucerotiformes, Ciconiiformes and Podicipediformes) (Figure 5). Previous records indicate that Mirza (2012) identified 157 avian species, Grimm et al. (2016) identified 162 species, and BirdLife reported 142 species (<https://www.birdlife.org/>) from Islamabad (Table 2).

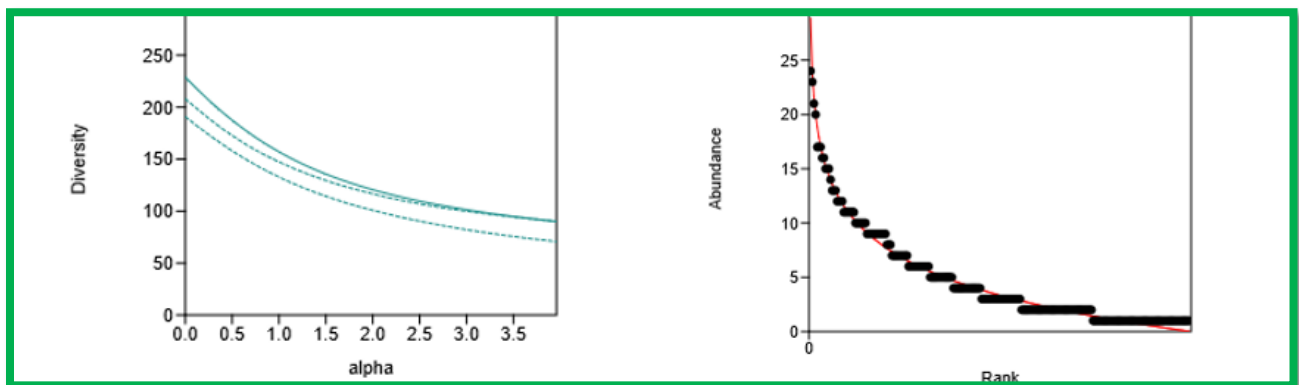


Figure 2: Diversity and abundance of avian species in study.

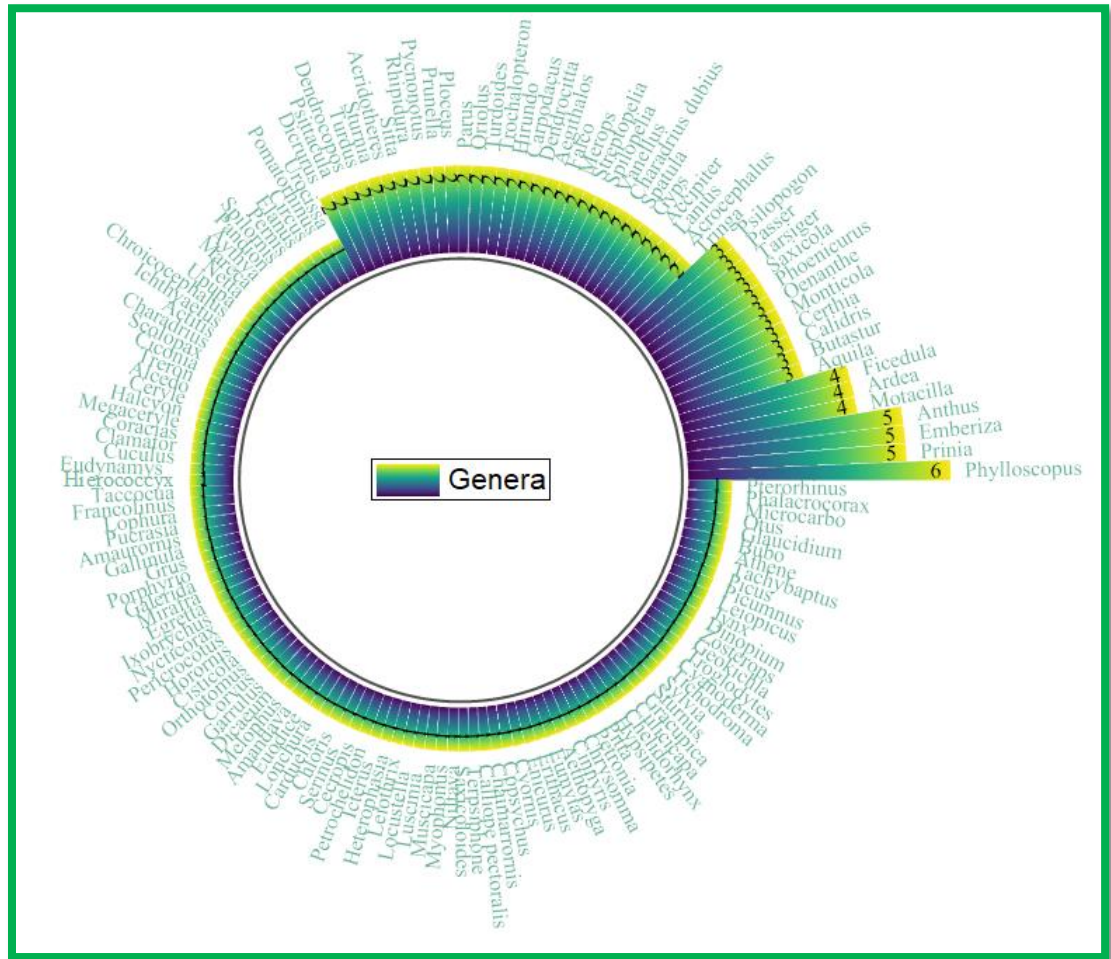


Figure 3: Genera of avian species in study.

The study area shows a high diversity of avian life, some of which are dominant in this avian landscape. Among these species, Blue-tailed Bee-eater (*Merops philippinus*), Khalij Pheasant (*Lophura leucomelanos*), Plumbeous Water Redstart (*Phoenicurus fuliginosus*), Common Kingfisher (*Alcedo atthis*), Long-legged Buzzard (*Buteo rufinus*), Western Marsh Harrier (*Circus aeruginosus*), Red-billed Leiothrix (*Leiothrix lutea*), Orange-headed Thrush (*Geokichla citrina*), Blue-capped Rock Thrush (*Monticola cinclorhyncha*), Asian Barred Owlet (*Glaucidium cuculoides*) and the Crested Kingfisher (*Megaceryle lugubris*) (Table 1).

The dominance index (i.e. 0.00739) was significantly low, indicating that no particular avian species overwhelmingly dominated the community, thus representing a well-balanced ecological composition. The Simpson diversity index (i.e. 0.9926) neared its upper limit (1), indicating a very diverse and stable ecosystem with a low likelihood that two randomly chosen individuals come from the same avian species. This high diversity was further confirmed by the Shannon–Wiener diversity index ($H' = 5.16$), which states that values of greater than 4 most appropriately describe a complex and stable ecological system with high species heterogeneity.

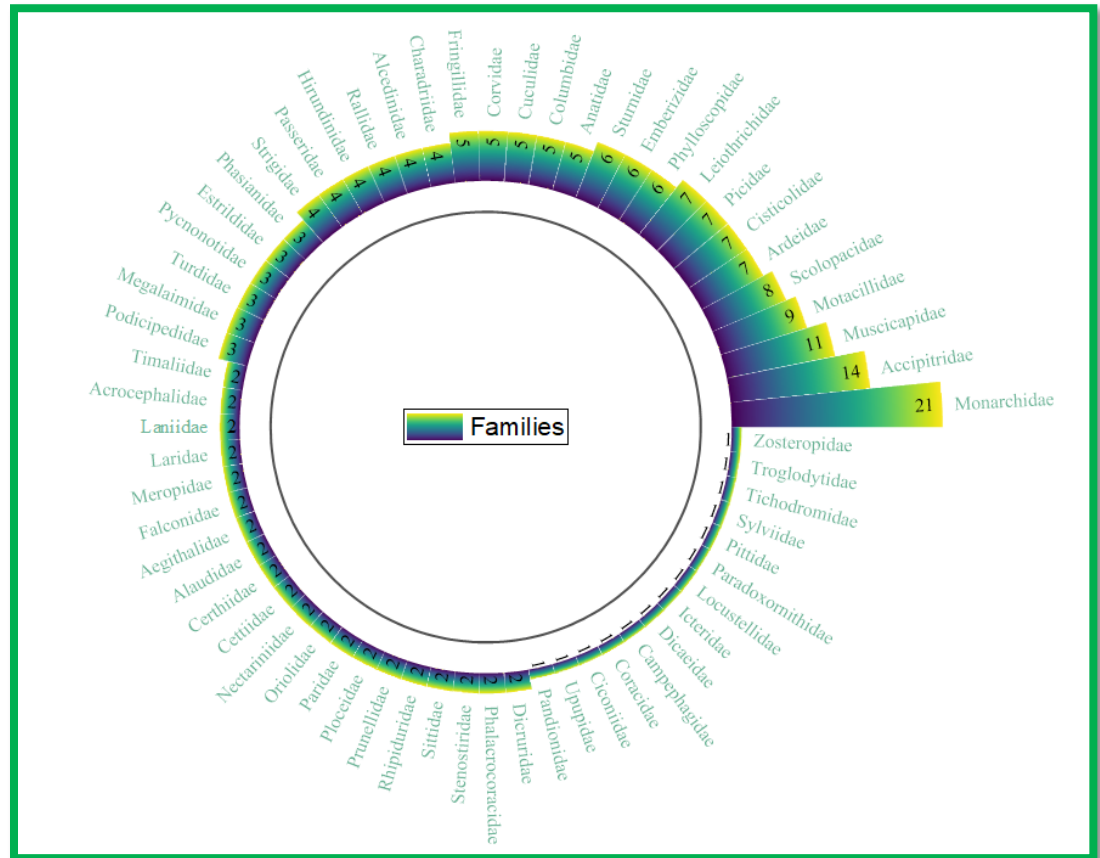


Figure 4: Families of avian species in study.

The evenness index (i.e. 0.7608), thus, indicated relatively equitable distribution of individuals among species, meaning that while some species may be more abundant than others, they would not be extremely different. Moreover, the Margalef index had a value (i.e. 32.56) which highlighted great avian species richness (Table 3). This stems from higher values generally pointing towards a more complex habitat possessing more ecological niches. Altogether, these diversity indices point towards an ecologically stable and resilient rich community because their species distribution, suppression, and abundance reflect low dominance and, high biodiversity.

The information from the IUCN Red List offers a summary of species diversity and their conservation status. Most of the species documented, totaling 226, are categorized as Least Concern (LC), which signifies a relatively stable population and a lower risk of extinction. Nonetheless, there are species in more threatened categories, with one species i.e. Steppe Eagle (*Aquila nipalensis*) identified as Endangered (EN) and Tawny Eagle (*Aquila rapax*) as Vulnerable (VU), underscoring conservation issues. Furthermore, two species (Himalayan Griffon Vulture *Gyps himalayensis* and Northern Lapwing *Vanellus vanellus*) are classified as Near Threatened (NT), indicating they could face potential risks in the future if conservation measures are not sustained (Figure 6).

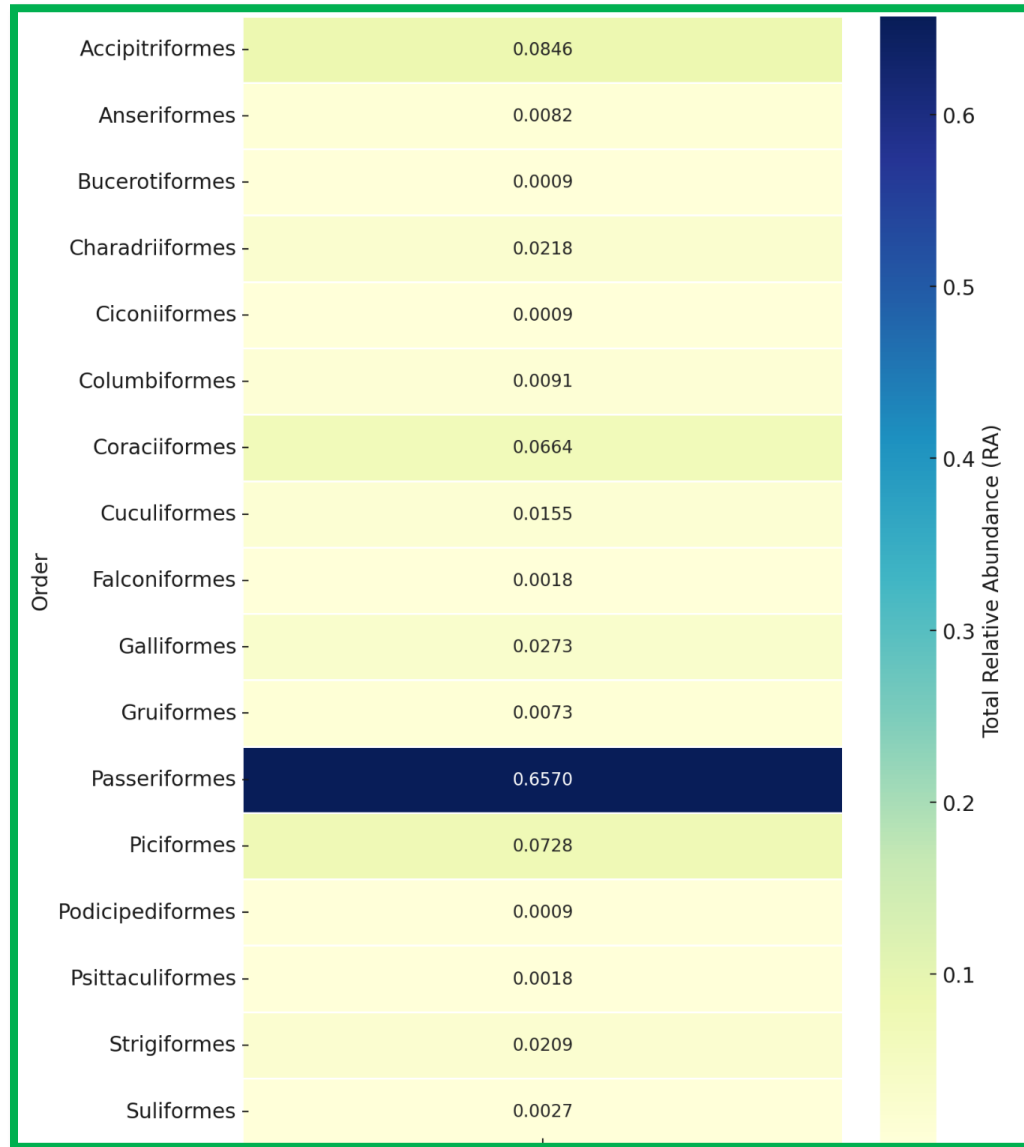


Figure 5: Heat-map showing the relative abundance of orders in study area.

We have identified 24 new bird species in Islamabad that were missing from previous ornithological records, Mirza (2012), Grimmer et al. (2016) and BirdLife (<https://www.birdlife.org/>) which enhances our understanding of the region's bird diversity. The newly described species are Black Bittern, Black-headed Gull, Black-throated Tit, Chestnut-tailed Starling, Cinereous Tit, Citrine Wagtail, Eurasian Woodcock, Fire-fronted Serin, Great Cormorant, Grey-sided Bush-Warbler, Hair-crested Drongo, Indian Bushlark, Little Cormorant, Red Avadavat, Ring Plover, Spanish Sparrow, Striated Babbler, Thick-billed Flowerpecker, Eurasian Treecreeper, Yellow-billed Blue Magpie, Yellow Oriole, Yellow-footed Green Pigeon, and Yellow-throated Sparrow. Apart from enriching the known avifaunal catalogue of the area, the finding also draws attention towards the ecological significance of

Islamabad, thus requiring further attention for ornithological research and conservation (Figure 7).

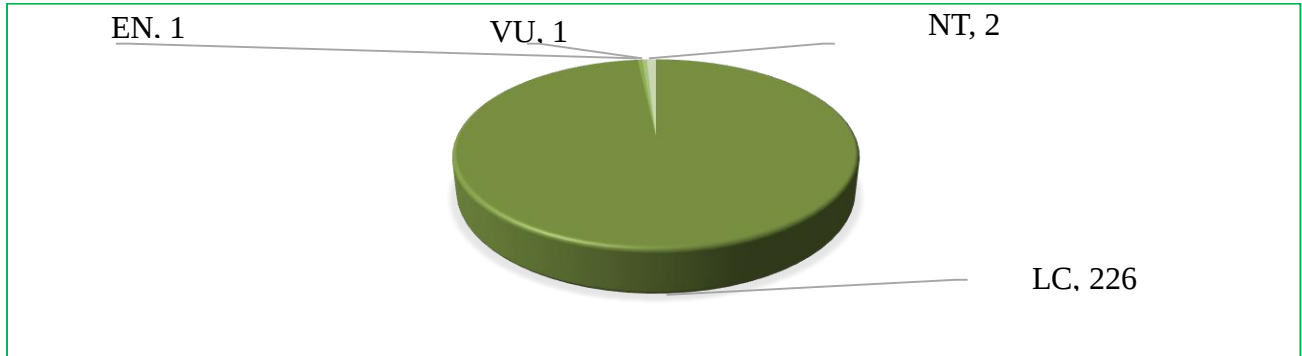


Figure 6: Status of the species in the study area according to IUCN.



Figure 7: New species reported from Islamabad, Pakistan.

The Steppe Eagle *Aquila nipalensis* has experienced a significant decline across its western breeding range, primarily due to habitat conversion for agriculture and direct persecution (Figure 8). It has been extirpated from Romania, Moldova, and Ukraine and faces additional threats from power lines and potential wind energy developments. The species has been identified as the raptor most frequently electrocuted by power lines in western Kazakhstan and Saudi Arabia. In Russia and Kazakhstan, key threats include increased mortality from collisions, pesticide poisoning, and habitat reduction due to both overgrazing and under-grazing. Poor breeding success is often a result of nest destruction and human disturbances. Furthermore, young eagles are illegally captured for sale in Western Europe, and recent studies indicate illegal killings in Jordan despite the species having legal protection. Additionally, the widespread use of the veterinary drug diclofenac in its wintering range poses further threats to its survival (BirdLife-International, 2021a; McGrady et al., 2021; Абушин and Эрденов, 2021; Ahmad et al., 2022; Shobrak et al., 2022; Özbahar et al., 2023; Almasieh et al., 2024).



Figure 8: Threatened species (by IUCN) reported from Islamabad, Pakistan.

The Tawny Eagle (*Aquila rapax*) have declined (Figure 8) in due to the consumption of poisoned carcasses, while the poisoning of feral dogs in Ethiopia has become a critical issue. Declines have also been observed in western and north-east Africa, but the causes remain unknown. In general, this species shows opportunistic behaviors that suggest some Died resilience to normal threats but may suffer future breeding penetration effects from changing rainfall patterns. In South Africa, such

birds drown accidentally in farm reservoirs and die due to collisions with power lines and vehicles on the road scavenging. Other threats are direct persecution and unintentional poisoning while concerns may arise with regard to the impact of NSAIDs like diclofenac on related species (Wichmann et al., 2004; BirdLife-International, 2021b).

The primary threat to the Himalayan Griffon Vulture *Gyps himalayensis* species (Figure 8) is mortality from ingesting diclofenac and other vulture-toxic non-steroidal anti-inflammatory drugs (NSAIDs), which are particularly prevalent in South Asia. Since the 1990s, diclofenac has led to significant declines in three *Gyps* species in the region due to kidney failure resulting from ingestion. Although the veterinary use of diclofenac is less common among breeding populations of *G. himalayensis*, juveniles migrating to lowland areas may still encounter it. A notable decline in the Upper Mustang region of Nepal between 2002 and 2005 was likely linked to diclofenac poisoning. After the drug was banned in Nepal in 2006, *G. himalayensis* populations showed signs of partial recovery. Similarly in September 2006 veterinary use of diclofenac was also banned in Pakistan and an alternate drug Meloxicam was registered for veterinary use.

However, variations of NSAIDs, including diclofenac, remain available and continue to pose risks to immature birds in northern India and Pakistan. Other threats include habitat degradation, a lack of nesting sites, and the ingestion of various chemicals. On the Qinghai-Tibet plateau, threats arise from chemical control of pikas and carcass removal. In Thailand, the absence of natural food sources has necessitated the rehabilitation of juvenile vultures. Additionally, habitat alterations in Pakistan may hinder the visibility of carcasses. Electrocution and collisions with energy infrastructure also represent potential threats, although documented evidence of these occurrences is limited (Li and Kasorndorkbua, 2008; Lu et al., 2009; Siddique and Khan, 2016; Bhusal et al., 2021; BirdLife-International, 2021c; Ummee et al., 2025).

The Northern Lapwing *Vanellus vanellus* has suffered considerable reductions in the past due to factors such as increased land usage (Figure 8), wetland drainage, and egg collection unfortunately, land-use intensification remains a danger today, resulting in decreasing breeding success due to changing agricultural methods. This includes the improvement of grasslands by methods such as drainage, the application of inorganic fertilizers, and reseeded, as well as an increase in "winter-crop" farming and the loss of field edges and semi-natural habitats. Key migratory stopover locations for this species along the Baltic Sea coast are threatened by oil pollution, the draining of wetlands for irrigation, land abandonment, and evolving land management practices that lead to scrub encroachment. Moreover, the destruction of clutches can occur during spring plowing when machinery is used on cultivated fields. The species is also susceptible to avian botulism, which could pose a risk if future outbreaks of the disease occur (Del Hoyo et al., 1992; Hubalek et al., 2005; Eggers et al., 2011; Królikowska et al., 2016; BirdLife-International, 2017).

CONCLUSION

The study concludes that the studied area contains a diverse bird population. The documentation of 230 species, representing 151 genera, 63 families, and 17 orders,

demonstrates the city's various ecosystems, which range from woods and wetlands to urban green spaces. Notably, 23 new bird species were discovered in the region, expanding Pakistan's known avifauna spread. The study also emphasizes the need for ongoing monitoring and conservation efforts to safeguard bird populations from new threats such as habitat degradation, climate change, and human disruptions. Future studies should focus on understanding the spatial distribution and habitat preferences of bird species across different ecological zones in Islamabad. Additionally, it is essential to assess the impact of human activities—such as urban development, pollution, and deforestation—on bird populations to develop effective conservation strategies. Given Islamabad's strategic location at the intersection of three major biogeographic regions, further ornithological research is vital for enhancing our understanding of species distribution, population dynamics, and conservation requirements. These findings will provide a valuable foundation for future bird studies and biodiversity conservation initiatives in the region.

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REFERENCES

- Ahmad, S., R. H. Khattak, L. Teng, K. Kaneez, and Z. Liu. 2022. Factors affecting habitat selection of endangered steppe eagle (*Aquila nipalensis*) in Pakistan: implications for raptors conservation. *Diversity*. 14: 1135.
- Ali, A., M. Altaf, and M. S. H. Khan. 2016. Winter survey of birds at Ketī Bunder, district Thatha, Pakistan. *Punjab Univ. J. Zool*. 31: 203-208.
- Ali, A., M. S. H. Khan, and M. Altaf. 2020. Analysis of anthropogenic activities on avian diversity along the coastal landscape of Sindh, Pakistan *Journal of Wildlife and Ecology*. 4: 94-110.
- Ali, Z., and M. Akhtar. 2005. Bird surveys at wetlands in Punjab, Pakistan, with special reference to the present status of White-headed Duck *Oxyura leucocephala*. *Forktail*. 21: 43.
- Almasieh, K., M. Cheraghi, A. Khani, and T. Shahi. 2024. Evaluation of habitat suitability and migratory paths of an endangered raptor, Steppe Eagle (*Aquila nipalensis*) in Iran. *Global Ecology and Conservation*. 55: e03236.
- Altaf, M. 2010. Ecology and Diversity of Birds of Head Qadirabad, Gujranwala, Pakistan, Department Wildlife and Ecology, University of Veterinary and Animal Sciences, Lahore.
- Altaf, M. 2016. Assessment of avian and mammalian diversity at selected sites along river Chenab, University of Veterinary and Animal Sciences, Lahore, Pakistan.
- Altaf, M., A. Javid, A. M. Khan, M. Khan, M. Umair, and 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.

- Aslam, A., I. A. Rana, and S. S. Bhatti. 2021. The spatiotemporal dynamics of urbanisation and local climate: A case study of Islamabad, Pakistan. *Environmental Impact Assessment Review*. 91: 106666.
- Bhusal, K. P., H. L. Dangaura, and C. J. McClure. 2021. Population levels and productivity of the Himalayan Griffon (*Gyps himalayensis*) in Baitadi District, Nepal. *Environmental Challenges*. 5: 100318.
- BirdLife-International. 2017. *Vanellus vanellus*. The IUCN Red List of Threatened Species 2017.
- BirdLife-International. 2021a. *Aquila nipalensis*. The IUCN Red List of Threatened Species, BirdLife International.
- BirdLife-International. 2021b. *Aquila rapax*. The IUCN Red List of Threatened Species 2021, BirdLife International.
- BirdLife-International. 2021c. *Gyps himalayensis*. The IUCN Red List of Threatened Species 2021.
- Buhaug, H., and H. Urdal. 2013. An urbanization bomb? Population growth and social disorder in cities. *Global environmental change*. 23: 1-10.
- Del Hoyo, J., A. Elliott, and J. Sargatal. 1992. *Handbook of the birds of the world*. Lynx edicions Barcelona.
- Eggers, S., M. Unell, and T. Pärt. 2011. Autumn-sowing of cereals reduces breeding bird numbers in a heterogeneous agricultural landscape. *Biological conservation*. 144: 1137-1144.
- Grimmett, R., C. Inskipp, and T. Inskipp. 2016. *Birds of the Indian Subcontinent: India, Pakistan, Sri Lanka, Nepal, Bhutan, Bangladesh and the Maldives*. Bloomsbury Publishing.
- Grimmett, R., T. J. Roberts, T. Inskipp, and C. Byers. 2008. *Birds of Pakistan*. A&C Black.
- Hasan, L., A. Chaudhry, A. Ahmed, and H. Jalil. 2022. The Islamabad Master Plan. *The Pakistan development review*. 61: 501-509.
- Hubalek, Z., V. Skorpikova, and D. Horal. 2005. Avian botulism at a sugar beet processing plant in South Moravia (Czech Republic). *Veterinarni Medicina-Praha-*. 50: 443.
- Kazam, A., S. Sidra, Z. Ali, R. Ahmad, A. Bilal, and A. Batool. 2024. Field Validation of Avian Diversity at Uchalli Wetland Complex: A Ramsar Site in Khushab, Pakistan. *Pakistan Journal of Zoology*. 56.
- Khan, A., S. Hussain, A. Bakhet, A. Anwer, S. M. Raza, S. Ali, and M. Zakarya. 2025. Climate time series variability analysis of Islamabad Capital Territory using fractal dimension and Hurst exponent methods. *Journal of Atmospheric and Solar-Terrestrial Physics*. 267: 106406.
- Królikowska, N., J. Szymkowiak, R. A. Laidlaw, and L. Kuczyński. 2016. Threat-sensitive anti-predator defence in precocial wader, the northern lapwing *Vanellus vanellus*. *acta ethologica*. 19: 163-171.
- Li, Y. D., and C. Kasorndorkbua. 2008. The status of the Himalayan Griffon *Gyps himalayensis* in South-east Asia. *Forktail*. 24: 57-62.
- Lu, X., D. Ke, X. Zeng, G. Gong, and R. Ci. 2009. Status, ecology, and conservation of the Himalayan Griffon *Gyps himalayensis* (Aves, Accipitridae) in the Tibetan Plateau. *AMBIO: a Journal of the Human Environment*. 38: 166-173.
- McGrady, M., E. Bragin, I. Karyakin, N. Batbayar, and T. Katzner. 2021. Steppe eagle *Aquila nipalensis* Migration Strategies of Birds of Prey in Western Palearctic. p 108-116. CRC Press.
- Mirza, Z. 2012. *A field guide to birds of Pakistan*. WWF.
- Mirza, Z. B., and H. Wasiq. 2007. *A field guide to birds of Pakistan* Bookland, Lahore.
- Özbahar, İ., Ö. Özkoç, S. İsfendiyaroğlu, and B. Tatar. 2023. Species Action Plan for Conservation of an Isolated Steppe Eagle Population in Turkey. *Пернатые хищники и их охрана*. 220-223.
- Rahman, Q., M. Nadeem, and M. Altaf. 2023. Study of avian diversity at selected sites Along Tarbela Dam, Indus River, Pakistan. *Journal of animal and plant sciences-JAPS*. 33: 241-248.
- Rahman, Q., M. Nadeem, M. Altaf, S. Khan, A. Saeed, J. Naseer, M. Hamed, A. Kayani, and M. Rais. 2021. Assessment of anthropogenic-causing-agents act on waterbirds-diversity in the vicinity of Tarbela Dam, Indus River, Pakistan. *Brazilian Journal of Biology*. 84: e251197.
- Rasool, G., A. Aihetasham, Z. Ali, and R. Ahmad. 2023. Avian Richness, Assemblages and Migration Connectivity of Geese Species with Habitat Suitability in Wetlands of the Punjab, Pakistan.
- Roberts, T. J. 1991. *The birds of Pakistan*.
- Roberts, T. J. 1992. *The birds of Pakistan*.
- Rodrigues, A. G., M. Borges-Martins, and F. Zilio. 2018. Bird diversity in an urban ecosystem: the role of local habitats in understanding the effects of urbanization. *Iheringia. Série Zoologia*. 108: e2018017.
- Shobrak, M., S. Alasmari, A. Alqthami, F. Alqthami, A. Al-Otaibi, M. Al Zoubi, L. El Moghrabi, S. Jbour, N. G. Asswad, and S. Oppel. 2022. Electric infrastructure poses a significant threat at congregation sites of the globally threatened Steppe Eagle *Aquila nipalensis* in Saudi Arabia. *Bird Conservation International*. 32: 313-321.

- Siddique, M., and A. A. Khan. 2016. Spatio-temporal decline of Himalayan Griffon (*Gyps himalayensis* Hume, 1869) in Azad Jammu and Kashmir, Pakistan. Pakistan Journal of Zoology. 48.
- Ummee, C., R. Sitdhibutr, P. Lertwatcharasarakul, and C. Kasornrorkbua. 2025. Deep mitochondrial phylogeographical pattern: cryptic population structure within an ecological niche in the near-threatened Himalayan vulture (*Gyps himalayensis*). Biological Journal of the Linnean Society. 144: blae021.
- Wichmann, M. C., W. R. Dean, and F. Jeltsch. 2004. Global change challenges the Tawny Eagle (*Aquila rapax*): modelling extinction risk with respect to predicted climate and land use changes.
- Абушин, А., and Г. Эрдненов. 2021. Steppe Eagle in the Republic of Kalmykia (Russia): Results of the 2021 Survey. Пернатые хищники и их охрана. 69-107.

Table 1: Diversity of birds in Islamabad.

Sr.	Order Family	Common name	Scientific name	Status	Relative Abundance
1.	Accipitriformes Accipitridae	Bonelli's Eagle	<i>Aquila fasciata</i> Vieillot, 1822	LC	0.0027
2.		Steppe Eagle	<i>Aquila nipalensis</i> Hodgson, 1833	EN	0.0091
3.		Tawny Eagle	<i>Aquila rapax</i> (Temminck, 1828)	VU	0.0009
4.		Shikra	<i>Accipiter badius</i> (Gmelin, 1788)	LC	0.0036
5.		Eurasian Sparrow hawk	<i>Accipiter nisus</i> (Linnaeus, 1758)	LC	0.0064
6.		White eyed Buzzard	<i>Butastur teesa</i> (Franklin, 1831)	LC	0.0027
7.		Steppe Buzzard	<i>Buteo buteo</i> (Linnaeus, 1758)	LC	0.0082
8.		Long legged Buzard	<i>Buteo rufinus</i> (Cretzschmar, 1829)	LC	0.0155
9.		Western marsh harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)	LC	0.0136
10.		Black winged Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	LC	0.0027
11.		Eurasian Griffon Vulture	<i>Gyps fulvus</i> (Hablizl, 1783)	LC	0.0036
12.		Himalayan Griffon Vulture	<i>Gyps himalayensis</i> (Hume, 1869)	NT	0.0009
13.		Oriental honey Buzzard	<i>Pernis ptilorhynchus</i> (Temminck, 1824)	LC	0.0055
14.		Crested serpent Eagle	<i>Spilornis cheela</i> (Latham, 1790)	LC	0.0073
15.	Pandionidae	Osprey	<i>Pandion haliaetus</i> (Linnaeus, 1758)	LC	0.0018
16.	Anseriformes Anatidae	Tufted Duck	<i>Aythya fuligula</i> (Linnaeus, 1758)	LC	0.0018
17.		Eurasian Wigeon	<i>Mareca Penelope</i> (Linnaeus, 1758)	LC	0.0018
18.		Red crested Pochard	<i>Netta rufina</i> (Pallas, 1773)	LC	0.0009
19.		Northern Shoveler	<i>Spatula clypeata</i> (Linnaeus, 1758)	LC	0.0018
20.		Garganey	<i>Spatula querquedula</i> (Linnaeus, 1758)	LC	0.0018
21.	Bucerotiformes	Eurasian Hoopoe	<i>Upupa epops</i>	LC	0.0009

	Upupidae		(Linnaeus, 1758)		
22.	Charadriiformes	Little ringed Plover	<i>Charadrius dubius</i>	LC	0.0018
	Charadriidae		(Scopoli, 1786)		
23.		Ring Plover	<i>Charadrius hiaticula</i>	LC	0.0018
			(Linnaeus, 1758)		
24.		Red wettled Lapwing	<i>Vanellus indicus</i>	LC	0.0018
			(Boddaert, 1783)		
25.		Northern Lapwing	<i>Vanellus vanellus</i>	NT	0.0009
			(Linnaeus, 1758)		
26.	Laridae	Black headed Gull	<i>Chroicocephalus ridibundus</i>	LC	0.0018
			(Linnaeus, 1766)		
27.		Pallas Gull	<i>Ichthyaeetus ichthyaeetus</i>	LC	0.0018
			(Pallas, 1773)		
28.	Scolopacidae	Common Sandpiper	<i>Actitis hypoleucos</i>	LC	0.0018
			(Linnaeus, 1758)		
29.		Little Stint	<i>Calidris minuta</i>	LC	0.0009
			(Leisler, 1812)		
30.		Ruff	<i>Calidris pugnax</i>	LC	0.0018
			(Linnaeus, 1758)		
31.		Temminck's Stint	<i>Calidris temminckii</i>	LC	0.0027
			(Leisler, 1812)		
32.		Kehtish Plover	<i>Charadrius alexandrinus</i>	LC	0.0018
			(Linnaeus, 1758)		
33.		Eurasian Woodcock	<i>Scolopax rusticola</i>	LC	0.0009
			(Linnaeus, 1758)		
34.		Common Greenshank	<i>Tringa nebularia</i>	LC	0.0009
			(Gunnerus, 1767)		
35.		Green Sandpiper	<i>Tringa ochropus</i>	LC	0.0009
			(Linnaeus, 1758)		
36.	Ciconiiformes	Black Stork	<i>Ciconia nigra</i>	LC	0.0009
	Ciconiidae		(Linnaeus, 1758)		
37.	Columbiformes	Spotted Dove	<i>Spilopelia chinensis</i>	LC	0.0027
	Columbidae		(Scopoli, 1786)		
38.		Laughing Dove	<i>Spilopelia senegalensis</i>	LC	0.0009
			(Linnaeus, 1766)		
39.		Collar Dove	<i>Streptopelia decaocto</i>	LC	0.0027
			(Frisvaldszky, 1838)		
40.		Oriental turtle Dove	<i>Streptopelia orientalis</i>	LC	0.0018
			(Latham, 1790)		
41.		Yellow footed green Pigeon	<i>Treron phoenicopterus</i>	LC	0.0009
			(Latham, 1790)		
42.	Coraciiformes	Common Kingfisher	<i>Alcedo atthis</i>	LC	0.0118
	Alcedinidae		(Linnaeus, 1758)		
43.		Pied Kingfisher	<i>Ceryle rudis</i>	LC	0.0036
			(Linnaeus, 1758)		
44.		White throatened Kingfisher	<i>Halcyon smyrnensis</i>	LC	0.0045
			(Linnaeus, 1758)		
45.		Crested Kingfisher	<i>Megaceryle lugubris</i>	LC	0.0146
			(Timminck, 1834)		
46.	Coracidae	Indian Roller	<i>Coracias benghalensis</i>	LC	0.0064
			(Linnaeus, 1758)		
47.	Meropidae	Green bee eater	<i>Merops orientalis</i>	LC	0.0036
			(Latham, 1801)		
48.		Blue tailed bee eater	<i>Merops philippinus</i>	LC	0.0218

			(Linnaeus, 1767)		
49.	Cuculiformes	Jacobin Cuckoo	<i>Clamator jacobinus</i>	LC	0.0082
			(Boddaert, 1783)		
50.		Common Cuckoo	<i>Cuculus canorus</i>	LC	0.0009
			(Linnaeus, 1758)		
51.		Asian koel	<i>Eudynamys scolopaceus</i>	LC	0.0036
			(Linnaeus, 1758)		
52.		Common Hawk Cuckoo	<i>Hierococcyx varius</i>	LC	0.0009
			(Vahl, 1797)		
53.		Sirkeer Malkoha	<i>Taccocua leschenaultia</i>	LC	0.0018
			(Lesson, 1830)		
54.	Falconiformes	Peregrine Falcon	<i>Falco peregrinus</i>	LC	0.0009
	Falconidae		(Tunstall, 1771)		
55.		Common Kestrel	<i>Falco tinnunculus</i>	LC	0.0009
			(Linnaeus, 1758)		
56.	Galliformes	Grey Francolin	<i>Francolinus pondicerianus</i>	LC	0.0055
	Phasianidae		(Gmelin, JF, 1789)		
57.		Khalij Pheasant	<i>Lophura leucomelanos</i>	LC	0.0209
			(Latham, 1790)		
58.		Black Francolin	<i>Francolinus francolinus</i>	LC	0.0009
			(Linnaeus, 1766)		
59.	Gruiformes	White breasted Waterhen	<i>Amaurornis phoenicurus</i>	LC	0.0009
	Rallidae		(Pennant, 1769)		
60.		Eurasian Moorhen	<i>Gallinula chloropus</i>	LC	0.0009
			(Linnaeus, 1758)		
61.		Demoiselle Crane	<i>Grus virgo</i>	LC	0.0045
			(Linnaeus, 1758)		
62.		Grey headed Swampphen	<i>Porphyrio poliocephalus</i>	LC	0.0009
			(Latham, 1801)		
63.	Passeriformes	Blyth's reed Warbler	<i>Acrocephalus dumetorum</i>	LC	0.0009
	Acrocephalidae		Blyth, 1849		
64.		Clamorous reed Warbler	<i>Acrocephalus stentoreus</i>	LC	0.0018
			(Hemprich & Ehrenberg, 1833)		
65.	Aegithalidae	Black throated Bushtit	<i>Aegithalos concinnus</i>	LC	0.0045
			(Gould, 1855)		
66.		White cheeked Bushtit	<i>Aegithalos leucogenys</i>	LC	0.0036
			(Horsfield & Moore, 1854)		
67.	Alaudidae	Crested Lark	<i>Galerida cristata</i>	LC	0.0045
			(Linnaeus, 1758)		
68.		Indian bushlark	<i>Mirafra erythroptera</i>	LC	0.0009
			Blyth, 1845		
69.	Ardeidae	Great White Egret	<i>Ardea alba</i>	LC	0.0018
			(Linnaeus, 1758)		
70.		Grey Heron	<i>Ardea cinerea</i>	LC	0.0018
			(Linnaeus, 1758)		
71.		Purple Heron	<i>Ardea purpurea</i>	LC	0.0009
			(Linnaeus, 1766)		
72.		Indian pond Heron	<i>Ardeola grayii</i>	LC	0.0018
			(Sykes, 1832)		
73.		Little Egret	<i>Egretta garzetta</i>	LC	0.0027
			(Linnaeus, 1766)		
74.		Black Bittern	<i>Ixobrychus flavicollis</i>	LC	0.0027
			(Latham, 1790)		

75.		Black crowned night Heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	LC	0.0055
76.	Campephagidae	Long tailed Minivet	<i>Pericrocotus ethologus</i> (Bangs & Phillips, JC, 1914)	LC	0.0045
77.	Certhiidae	Eurasian Treecreeper	<i>Certhia familiaris</i> Linnaeus, 1758	LC	0.0009
78.		Bar tailed Treecreeper	<i>Certhia himalayana</i> Vigors, 1832	LC	0.0018
79.	Cettiidae	Grey sided bush Warbler	<i>Cettia brunnifrons</i> (Hodgson, 1845)	LC	0.0009
80.		Brown flanked bush Warbler	<i>Horornis fortipes</i> (Hodgson, 1845)	LC	0.0018
81.	Cisticolidae	Zitting Cisticola	<i>Cisticola juncidis</i> (Rafinesque, 1810)	LC	0.0036
82.		Common Tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)	LC	0.0027
83.		Plain Prinia	<i>Prinia inornata</i> (Sykes, 1832)	LC	0.0027
84.		Rufous fronted Prinia	<i>Prinia buchanani</i> (Blyth, 1844)	LC	0.0009
85.		Yellow bellied Prinia	<i>Prinia flaviventris</i> (Delessert, 1840)	LC	0.0018
86.		Grey breasted Prinia	<i>Prinia hodgsonii</i> (Blyth, 1844)	LC	0.0009
87.		Ashay Prinia	<i>Prinia socialis</i> Sykes, 1832	LC	0.0009
88.	Corvidae	Rook	<i>Corvus frugilegus</i> (Linnaeus, 1758)	LC	0.0009
89.		Grey treepie	<i>Dendrocitta formosae</i> (R. Swinhoe, 1863)	LC	0.0055
90.		Rufous Treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	LC	0.0009
91.		Black headed Jay	<i>Garrulus lanceolatus</i> (Vigors, 1830)	LC	0.0109
92.		Red-billed Blue Magpie	<i>Urocissa erythroryncha</i> (Boddaert, 1783)	LC	0.0009
93.	Dicaeidae	Thick billed Flowerpecker	<i>Dicaeum agile</i> (Tickell, 1833)	LC	0.0009
94.	Dicruridae	Hair-crested Drongo	<i>Dicrurus hottentottus</i> (Linnaeus, 1766)	LC	0.0009
95.		Black Drongo	<i>Dicrurus macrocercus</i> (Vieillot, 1817)	LC	0.0036
96.	Emberizidae	Red headed Bunting	<i>Emberiza bruniceps</i> (Brandt, 1841)	LC	0.0055
97.		Rock Bunting	<i>Emberiza cia</i> (Linnaeus, 1766)	LC	0.0045
98.		Chestnut eared Bunting	<i>Emberiza fucata</i> (Pallas, 1776)	LC	0.0027
99.		Crested Bunting	<i>Emberiza lathami</i> (Gray, JE, 1831)	LC	0.0055
100.		Reed Bunting	<i>Emberiza schoeniclus</i> (Linnaeus, 1758)	LC	0.0009
101.		White capped Bunting	<i>Emberiza stewarti</i> (Blyth, 1854)	LC	0.0036

102.	Estrildidae	Red Avadavat	<i>Amandava amandava</i> (Linnaeus, 1758)	LC	0.0018
103.		Indian Silverbill	<i>Euodice malabarica</i> (Linnaeus, 1758)	LC	0.0109
104.		Scaly breasted Munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	LC	0.0082
105.	Fringillidae	Himalayan Goldfinch	<i>Carduelis carduelis</i> (Linnaeus, 1758)	LC	0.0009
106.		Common Rosefinch	<i>Carpodacus erythrinus</i> (Pallas, 1770)	LC	0.0100
107.		Pink brown Rosefinch	<i>Carpodacus rodochora</i> (Vigors, 1831)	LC	0.0036
108.		Yellow breasted Greenfinch	<i>Chloris spinoides</i> (Vigors, 1831)	LC	0.0073
109.		Fire fronted Serin	<i>Serinus pusillus</i> (Pallas, 1811)	LC	0.0018
110.	Hirundinidae	Red rumped Swallow	<i>Cecropis daurica</i> (Laxmann, 1769)	LC	0.0018
111.		Barn Swallow	<i>Hirundo rustica</i> (Linnaeus, 1758)	LC	0.0027
112.		Wire tailed Swallow	<i>Hirundo smithii</i> (Leach, 1818)	LC	0.0091
113.		Streaked throated Swallow	<i>Petrochelidon fluvicola</i> (Blyth, 1855)	LC	0.0009
114.	Icteridae	Yellow Oriole	<i>Icterus nigrogularis</i> (Hahn, 1819)	LC	0.0009
115.	Laniidae	Isabelline Shrike	<i>Lanius isabellinus</i> (Hemprich & Ehrenberg, 1833)	LC	0.0009
116.		Long tailed Shrike	<i>Lanius schach</i> (Lannaues, 1758)	LC	0.0036
117.	Leiothrichidae	Rufous Sibia	<i>Heterophasia capistrata</i> (Vigors, 1831)	LC	0.0009
118.		Red billed Leiothrix	<i>Leiothrix lutea</i> (Scopoli, 1786)	LC	0.0182
119.		Streaked Laughingthrush	<i>Trochalopteron lineatum</i> (Vigors, 1831)	LC	0.0082
120.		Variegated Laughingthrush	<i>Trochalopteron variegatum</i> (Vigors, 1831)	LC	0.0055
121.		White-throated Laughingthrush	<i>Pterorhinus albogularis</i> (Gould, 1836)	LC	0.0009
122.		Striated Babbler	<i>Turdoides earlei</i> (Blyth, 1844)	LC	0.0027
123.		Jungle Babbler	<i>Turdoides striata</i> (dumont, 1823)	LC	0.0045
124.		Grass hopper Warbler	<i>Locustella naevia</i> (Boddaert, 1783)	LC	0.0009
125.	Monarchidae	Bluethroat	<i>Luscinia svecica</i> (Linnaeus, 1758)	LC	0.0036
126.		Blue capped rock Thrush	<i>Monticola cinclorhyncha</i> (Vigors, 1831)	LC	0.0136
127.		Chestnut bellied Rock thrush	<i>Monticola rufiventris</i> (Jardine& Selby, 1833)	LC	0.0082
128.		Blue rock Thrush	<i>Monticola solitarius</i>	LC	0.0009

		(Linnaeus, 1758)		
129.	Dark sided Flycatcher	<i>Muscicapa sibirica</i> (Gmelin, JF, 1789)	LC	0.0045
130.	Blue whistling Thrush	<i>Myophonus caeruleus</i> (Scopoli, 1786)	LC	0.0055
131.	Rufous bellied Niltava	<i>Niltava sundara</i> (Hodgson, 1837)	LC	0.0155
132.	Brown Rockchat	<i>Oenanthe fusca</i> (Blyth, 1851)	LC	0.0036
133.	Isabelline Wheatear	<i>Oenanthe isabellina</i> (Temminck, 1824)	LC	0.0018
134.	Variable Wheatear	<i>Oenanthe picata</i> (Blyth, 1847)	LC	0.0018
135.	Blue capped Red-start	<i>Phoenicurus caeruleocephal</i> (Vigors, 1831)	LC	0.0082
136.	Evermann's Redstart	<i>Phoenicurus erythronotus</i> (Eversmann, 1841)	LC	0.0018
137.	Plumbeous water Redstart	<i>Phoenicurus fuliginosus</i> (Vigors, 1831)	LC	0.0191
138.	Pied Bush chat	<i>Saxicola caprata</i> (Linnaeus, 1766)	LC	0.0082
139.	Grey Bush chat	<i>Saxicola ferreus</i> (Gray, 1847)	LC	0.0091
140.	Siberian Stonechat	<i>Saxicola maurus</i> (Pallas, 1773)	LC	0.0100
141.	Indian Robin	<i>Saxicoloides fulicatus</i> (Linnaeus, 1766)	LC	0.0009
142.	Golden bush Robin	<i>Tarsiger chrysaeus</i> (Hodgson, 1845)	LC	0.0082
143.	Orange flaked bush Robin	<i>Tarsiger cyanurus</i> (Pallas, 1773)	LC	0.0064
144.	Himalayan Bluetail	<i>Tarsiger rufilatus</i> (Hodgson, 1845)	LC	0.0118
145.	Indian paradise Flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus, 1758)	LC	0.0064
146.	Motacillidae Rosy Pipet	<i>Anthus roseatus</i> Blyth, 1847	LC	0.0009
147.	Paddyfield Pipit	<i>Anthus rufulus</i> Vieillot, 1818	LC	0.0018
148.	Long billed Pipit	<i>Anthus similis</i> (Jerdon, 1840)	LC	0.0009
149.	Water Pipit	<i>Anthus spinoletta</i> (Linnaeus, 1758)	LC	0.0018
150.	Tree Pipit	<i>Anthus trivialis</i> (Linnaeus, 1758)	LC	0.0009
151.	White Wagtail	<i>Motacilla alba</i> (Linnaeus, 1758)	LC	0.0009
152.	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall, 1771	LC	0.0018
153.	Citrine Wagtail	<i>Motacilla citreola</i> Pallas, 1776	LC	0.0027
154.	Western yellow Wagtail	<i>Motacilla flava</i> Linnaeus, 1758	LC	0.0009
155.	Muscicapidae White tailed Rubythroat	<i>Calliope pectoralis</i>	LC	0.0027

		Gould, 1837		
156.	White capped Redstart	<i>Chaimarrornis leucocephalus</i>	LC	0.0100
157.	Oriental magpie Robin	Vigors, 1831 <i>Copsychus saularis</i>	LC	0.0027
158.	Blue throated blue Flycatcher	(Linnaeus, 1758) <i>Cyornis rubeculoides</i>	LC	0.0109
159.	Spotted Forktail	(Vigors, 1831) <i>Enicurus maculatus</i>	LC	0.0045
160.	Europeon Robin	(Vigors, 1831) <i>Erithacus rubecula</i>	LC	0.0027
161.	Verditer Flycatcher	(Linnaeus, 1758) <i>Eumyias thalassinus</i>	LC	0.0055
162.	Taiga Flycatcher	(Swainson, 1838) <i>Ficedula albicilla</i>	LC	0.0091
163.	Red breasted Flycather	(Pallas, 1811) <i>Ficedula parva</i>	LC	0.0018
164.	Ultramarine Flycather	(Bechstein, 1792) <i>Ficedula superciliaris</i>	LC	0.0045
165.	Slaty blue Flycatcher	(Jerdon, 1840) <i>Ficedula tricolor</i>	LC	0.0091
166.	Crimson Sunbird	(Hodgson, 1845) <i>Aethopyga siparaja</i>	LC	0.0091
167.	Purple Sunbird	(Raffles, 1822) <i>Cinnyris asiaticus</i>	LC	0.0055
168.	Indian golden Oriole	(Latham, 1790) <i>Oriolus kundoo</i>	LC	0.0018
169.	Golden Oriole	(Sykes, 1832) <i>Oriolus oriolus</i>	LC	0.0009
170.	Yellow eyed Babbler	(Linnaeus, 1758) <i>Chrysomma sinense</i>	LC	0.0055
171.	Green backed Tit	(Gmelin, 1788) <i>Parus monticolus</i>	LC	0.0009
172.	Cinereous Tit	(Vigors, 1831) <i>Parus cinereus</i>	LC	0.0064
173.	Russet Sparrow	(Vieillot, 1818) <i>Passer cinnamomeus</i>	LC	0.0064
174.	House Sparrow	(Gould, 1836) <i>Passer domesticus</i>	LC	0.0009
175.	Spanish sparrow	(Linnaeus, 1758) <i>Passer hispaniolensis</i>	LC	0.0009
176.	Yellow throated Sparrow	(Timminck, 1820) <i>Petronia xanthocollis</i>	LC	0.0036
177.	Lemon rumped Warbler	(Burton, 1838) <i>Phylloscopus chloronotus</i>	LC	0.0027
178.	Common Chiffchaff	(Gray, JE & Gray, 1847) <i>Phylloscopus collybita</i>	LC	0.0045
179.	Sulphur bellied Warbler	(Vieillot, 1817) <i>Phylloscopus griseolus</i>	LC	0.0064
180.	Hume's leaf Warbler	(Blyth, 1847) <i>Phylloscopus humei</i>	LC	0.0027
181.	Whistler's Warbler	(Brook, 1878) <i>Phylloscopus whistleri</i>	LC	0.0055
		(Ticehurst, 1925)		

182.		Grey hooded Warbler	<i>Phylloscopus xanthoschistos</i> (Gray, JE & Gray, 1847)	LC	0.0100
183.	Pittidae	Indian Pitta	<i>Pitta brachyura</i> (Linnaeus, 1766)	LC	0.0009
184.	Ploceidae	Baya weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	LC	0.0064
185.		Streaked Weaver	<i>Ploceus manyar</i> (Horsfield, 1821)	LC	0.0018
186.	Prunellidae	Rufous breasted Accentor	<i>Prunella strophliata</i> (Blyth, 1843)	LC	0.0064
187.		Black throated Accenter	<i>Prunella atrogularis</i> (Brandt, 1843)	LC	0.0027
188.	Pycnonotidae	Himalayan black Bulbul	<i>Hypsipetes leucocephalus</i> (Gmelin, JF, 1789)	LC	0.0045
189.		Red vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	LC	0.0018
190.		Himalayan Bulbul	<i>Pycnonotus leucogenys</i> (Gray, JE, 1835)	LC	0.0082
191.	Rhipiduridae	White throated Fantail	<i>Rhipidura albicollis</i> (Vieillot, 1818)	LC	0.0055
192.		Eurasian Jay	<i>Garrulus glandarius</i> (Linnaeus, 1758)	LC	0.0045
193.	Sittidae	Chestnut bellied Nuthatch	<i>Sitta cinnamoventris</i> (Blyth, 1842)	LC	0.0018
194.		White cheeked Nuthatch	<i>Sitta leucopsis</i> (Gould, 1850)	LC	0.0018
195.	Stenostiridae	Yellow bellied fantail	<i>Chelidorhynch hypoxantha</i> (Blyth, 1843)	LC	0.0009
196.		Grey headed canary Flycather	<i>Culicicapa ceylonensis</i> (Swainson, 1820)	LC	0.0018
197.	Sturnidae	Jungle Myna	<i>Acridotheres fuscus</i> (Wagler, 1827)	LC	0.0009
198.		Bank Myna	<i>Acridotheres ginginianus</i> (Latham, 1790)	LC	0.0036
199.		Asian pied Starling	<i>Gracupica contra</i> (Linnaeus, 1758)	LC	0.0027
200.		Chestnut tailed Starling	<i>Sturnia malabarica</i> (Gmelin, 1789)	LC	0.0091
201.		Brahminay Myna	<i>Sturnia pagodarum</i> (Gmelin, JF, 1789)	LC	0.0027
202.		Europeon Starling	<i>Sturnus vulgaris</i> (Linnaeus, 1758)	LC	0.0036
203.	Sylviidae	Lesser Whitethroat	<i>Sylvia curruca</i> (Linnaeus, 1758)	LC	0.0009
204.	Tichodromidae	Wall Creeper	<i>Tichodroma muraria</i> (Linnaeus, 1766)	LC	0.0100
205.	Timaliidae	Black chinned Babbler	<i>Cyanoderma pyrrhops</i> (Blyth, 1844)	LC	0.0064
206.		Rusty cheeked scimitar Babbler	<i>Pomatorhinus erythrogyne</i> (Vigors, 1831)	LC	0.0109
207.	Troglodytidae	Eurasian Wren	<i>Troglodytes troglodytes</i> (Linnaeus, 1758)	LC	0.0018
208.	Turdidae	Orange headed Thrush	<i>Geokichla citrina</i> (Latham, 1790)	LC	0.0136

209.		Black throated Thrush	<i>Turdus atrogularis</i> (Jerocki, 1819)	LC	0.0027
210.		Grey winged Blackbird	<i>Turdus bouboul</i> (Latham, 1790)	LC	0.0127
211.	Zosteropidae	Indian white eye	<i>Zosterops palpebrosus</i> (Temminck, 1824)	LC	0.0155
212.	Piciformes Megalaaimidae	Blue throated Barbet	<i>Psilopogon asiaticus</i> (Latham, 1790)	LC	0.0100
213.		Coppersmith Barbet	<i>Psilopogon haemacephalus</i> (Statius Muller, 1776)	LC	0.0045
214.		Great Barbet	<i>Psilopogon virens</i> (Boddaert, 1783)	LC	0.0082
215.	Picidae	Fulvous breasted Woodpeker	<i>Dendrocopos macei</i> (Vieillot, 1818)	LC	0.0027
216.		Grey cap pygmy Woodpecker	<i>Dendrocopos canicapillus</i> (Blyth, 1845)	LC	0.0018
217.		Black Rumped Flameback	<i>Dinopium benghalense</i> (Linnaeus, 1758)	LC	0.0073
218.		Eurasian Wryneck	<i>Jynx torquilla</i> (Linnaeus, 1758)	LC	0.0082
219.		Brown fronted Woodpecker	<i>Leiopicus auriceps</i> (Vigors, 1831)	LC	0.0082
220.		Speckled Piculet	<i>Picumnus innominatus</i> (Burton, 1836)	LC	0.0118
221.		Scally bellied Woodpecker	<i>Picus squamatus</i> (Vigors, 1831)	LC	0.0100
222.	Podicipediformes Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	LC	0.0009
223.	Psittaculiformes Psittaculidae	Slaty headed Parakeet	<i>Psittacula himalayana</i> (Lesson, RP, 1831)	LC	0.0009
224.		Rose ringed Parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	LC	0.0009
225.	Strigiformes Strigidae	Spotted Owlet	<i>Athene brama</i> (Temminck, 1821)	LC	0.0036
226.		Indian Eagle Owl	<i>Bubo bengalensis</i> (Franklin, 1831)	LC	0.0009
227.		Asian barred Owlet	<i>Glaucidium cuculoides</i> (Vigors, 1830)	LC	0.0146
228.		Indian scops Owl	<i>Otus bakkamoena</i> (Pennant, 1769)	LC	0.0018
229.	Suliformes Phalacrocoracidae	Little Cormorant	<i>Microcarbo niger</i> (Vieillot, 1817)	LC	0.0018
230.		Great Cormorant	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)	LC	0.0009

Table 2: Distribution of avian species in Islamabad according to Mirza, 2012 (1), Grimmett et al., 2016 (2) and BirdLife (<https://www.birdlife.org/>) (3).

Common name	1	2	3
Bonelli's Eagle	Winter Visitor	Winter Visitor	Resident
Steppe Eagle	Winter Visitor	Winter Visitor	Winter Visitor
Tawny Eagle	Resident	Resident	Resident
Shikra	Passage Migrant	Resident	Resident
Eurasian Sparrow hawk	Summer Visitor	Winter Visitor	Winter Visitor
White eyed Buzzard	Resident	Resident	Resident
Steppe Buzzard	Passage Migrant	Not reported	Not reported
Long legged Buzzard	Winter Visitor	Winter Visitor	Winter Visitor
Western marsh harrier	Not reported	Not reported	Winter Visitor
Black winged Kite	Resident	Resident	Resident
Eurasian Griffon Vulture	Summer Breeder	Resident	Resident
Himalayan Griffon Vulture	Not reported	Not reported	Winter Visitor
Oriental honey Buzzard	Summer Breeder	Not reported	Resident
Crested serpent Eagle	Resident	Resident	Summer Breeder
Osprey	Not reported	Winter Visitor	Not reported
Tufted Duck	Winter Visitor	Winter Visitor	Winter Visitor
Eurasian Wigeon	Winter Visitor	Winter Visitor	Winter Visitor
Red crested Pochard	Not reported	Winter Visitor	Not reported
Northern Shoveler	Winter Visitor	Winter Visitor	Winter Visitor
Garganey	Winter Visitor	Winter Visitor	Not reported
Eurasian Hoopoe	Summer Breeder	Summer Visitor	Summer Breeder
Little ringed Plover	Summer Breeder	Winter Visitor	Resident
Ring Plover	Not reported	Not reported	Not reported
Red wettled Lapwing	Not reported	Resident	Resident
Northern Lapwing	Not reported	Winter Visitor	Winter Visitor
Black headed Gull	Not reported	Not reported	Not reported
Pallas Gull	Not reported	Winter Visitor	Not reported
Common Sandpiper	Winter Visitor	Not reported	Not reported
Little Stint	Not reported	Passage Migrant	Not reported
Ruff	Not reported	Passage Migrant	Not reported
Temminck's Stint	Not reported	Winter Visitor	Winter Visitor
Kehtish Plover	Not reported	Not reported	Winter Visitor
Eurasian Woodcock	Not reported	Not reported	Not reported
Common Greenshank	Not reported	Winter Visitor	Winter Visitor
Green Sandpiper	Not reported	Winter Visitor	Not reported

Black Stork			
Spotted Dove			
Laughing Dove			
Collar Dove			
Oriental turtle Dove			
Yellow footed green Pigeon			
Green bee eater			
Blue tailed bee eater			
Common Kingfisher			
Pied Kingfisher			
White throated Kingfisher			
Crested Kingfisher			
Indian Roller			
Jacobin Cuckoo			
Common Cuckoo			
Asian koel			
Common Hawk Cuckoo			
Sirkeer Malkoha			
Pregrine Falcon			
Common Kestrel			
Grey Francolin			
Khali Pheasant			
Black Francolin			
White breasted Waterhen			
Eurasian Moorhen			
Demoiselle Crane			
Grey headed Swampen			
White Wagtail			
Grey Wagtail			
Citrine Wagtail			
Western yellow Wagtail			
Blyth's reed Warbler			
Clamorous reed Warbler			
Black throated Bushtit			
White cheeked Bushtit			
Crested Lark			
Indian bushlark			
Great White Egret			
Grey Heron			

Purple Heron	Red	Red	Green
Indian pond Heron	Green	Green	Green
Little Egret	Pink	Green	Green
Black Bittern	Red	Red	Red
Black crowned night Heron	Orange	Orange	Green
Long tailed Minivet	Orange	Orange	Orange
Eurasian Treecreeper	Red	Red	Red
Bar tailed Treecreeper	Green	Blue	Blue
Grey sided bush Warbler	Red	Red	Red
Brown flanked bush Warbler	Orange	Pink	Orange
Zitting Cisticola	Red	Red	Green
Common Tailorbird	Green	Red	Green
Plain Prinia	Green	Red	Green
Rufous fronted Prinia	Green	Green	Green
Yellow bellied Prinia	Red	Green	Green
Grey breasted Prinia	Green	Green	Green
Ashay Prinia	Red	Red	Green
Rook	Blue	Blue	Blue
Grey treepie	Green	Red	Red
Rufous Treepie	Green	Green	Red
Black headed Jay	Green	Green	Green
Yellow billed blue Magpie	Red	Red	Red
Thick billed Flowerpecker	Red	Red	Red
Black Drongo	Green	Orange	Orange
Red headed Bunting	Red	Pink	Red
Rock Bunting	Blue	Green	Blue
Chestnut eared Bunting	Red	Orange	Red
Reed Bunting	Red	Blue	Blue
White capped Bunting	Blue	Orange	Blue
Crested Bunting	Orange	Green	Orange
Red Avadavat	Red	Red	Red
Indian Silverbill	Green	Green	Green
Scaly breasted Munia	Green	Green	Red
Himalayan Goldfinch	Blue	Blue	Red
Common Rosefinch	Blue	Orange	Red
Pink brown Rosefinch	Blue	Green	Red
Yellow breasted Greenfinch	Red	Blue	Blue
Fire fronted Serin	Red	Red	Red
Red rumped Swallow	Orange	Orange	Red

Barn Swallow	Blue	Orange	Orange
Wire tailed Swallow	Orange	Orange	Orange
Streaked throated Swallow	Red	Red	Green
Yellow Oriole	Red	Red	Red
Isabelline Shrike	Blue	Blue	Blue
Long tailed Shrike	Orange	Orange	Green
Rufous Sibia	Red	Green	Green
Red billed Leiothrix	Pink	Blue	Red
Streaked Laughingthrush	Green	Red	Red
Variegated Laughingthrush	Green	Green	Red
Striated Babbler	Red	Red	Red
Jungle Babbler	Green	Green	Green
Grass hopper Warbler	Blue	Blue	Red
Bluethroat	Orange	Blue	Pink
Blue capped rock Thrush	Orange	Yellow	Pink
Chestnut bellied Rock thrush	Red	Orange	Red
Blue rock Thrush	Blue	Blue	Blue
Dark sided Flycatcher	Orange	Orange	Pink
Blue whistling Thrush	Orange	Green	Blue
Rufous bellied Niltava	Red	Orange	Red
Brown Rockchat	Blue	Red	Red
Isabelline Wheatear	Red	Blue	Red
Variable Wheatear	Red	Blue	Red
Blue capped Red-start	Orange	Green	Red
Evermann's Redstart	Blue	Blue	Blue
Plumbeuos water Redstart	Orange	Orange	Red
Pied Bush chat	Orange	Orange	Green
Grey Bush chat	Blue	Orange	Red
Siberian Stonechat	Blue	Red	Pink
Indian Robin	Green	Green	Green
Golden bush Robin	Blue	Green	Green
Orange flaked bush Robin	Pink	Red	Red
Himalayan Bluetail	Red	Blue	Blue
Indian paradise Flycatcher	Blue	Orange	Orange
Rosy Pipet	Blue	Blue	Blue
Paddyfield Pipit	Red	Red	Green
Long billed Pipet	Green	Blue	Orange
Water Pipit	Red	Red	Blue
Tree Pipit	Blue	Orange	Pink

White tailed Rubythroat	Red	Green	Blue
White capped Redstart	Orange	Orange	Red
Oriental magpie Robin	Green	Red	Red
Blue throated blue Flycatcher	Orange	Red	Red
Spotted Forktail	Blue	Orange	Red
Europeon Robin	Red	Green	Red
Verditer Flycatcher	Red	Yellow	Orange
Taiga Flycatcher	Green	Red	Red
Red breasted Flycather	Blue	Red	Red
Ultramarine Flycather	Blue	Orange	Orange
Slaty blue Flycatcher	Blue	Yellow	Blue
Crimson Sunbird	Green	Green	Red
Purple Sunbird	Orange	Orange	Green
Indian golden Oriole	Red	Orange	Red
Golden Oriole	Orange	Red	Red
Yellow eyed Babbler	Green	Red	Green
Green backed Tit	Red	Green	Red
Cinereous Tit	Red	Red	Red
Russet Sparrow	Blue	Green	Red
House Sparrow	Blue	Green	Green
Spanish sparrow	Red	Red	Red
Yellow throated Sparrow	Red	Red	Red
Lemon rumped Warbler	Red	Blue	Red
Common Chiffchaff	Blue	Blue	Red
Sulphur bellied Warbler	Blue	Red	Red
Hume's leaf Warbler	Red	Red	Blue
Whistler's Warbler	Red	Green	Blue
Grey hooded Warbler	Blue	Green	Red
Indian Pitta	Blue	Red	Orange
Baya weaver	Green	Green	Green
Streaked Weaver	Green	Red	Green
Rufous breasted Accentor	Blue	Red	Green
Black throated Accenter	Blue	Blue	Blue
Himalayan black Bulbul	Blue	Green	Green
Red vented Bulbul	Green	Green	Green
Himalayan Bulbul	Green	Green	Green
White throated Fantail	Blue	Green	Green
Eurasian Jay	Green	Green	Red
Chestnut bellied Nuthatch	Blue	Red	Red

White cheeked Nuthatch	Red	Green	Green
Yellow bellied fantail	Blue	Blue	Red
Grey headed canary Flycather	Blue	Orange	Red
Jungle Myna	Green	Green	Green
Bank Myna	Green	Red	Green
Asian pied Starling	Red	Green	Green
Chestnut tailed Starling	Red	Red	Red
Brahminay Myna	Green	Orange	Orange
Europeon Starling	Blue	Blue	Blue
Lesser Whitethroat	Red	Blue	Blue
Wall Creeper	Blue	Blue	Blue
Black chinned Babbler	Green	Red	Red
Rusty cheeked scimitar Babbler	Green	Green	Green
Scimitar Babbler	Red	Red	Red
Eurasian Wren	Green	Green	Red
Orange headed Thrush	Orange	Orange	Orange
Black throated Thrush	Red	Blue	Blue
Grey winged Blackbird	Blue	Green	Green
Indian white eye	Green	Red	Green
Blue throated Barbet	Green	Green	Green
Coppersmith Barbet	Green	Green	Red
Great Barbet	Green	Green	Green
Fulvous breasted Woodpecker	Green	Green	Red
Grey capped pygmy Woodpecker	Green	Green	Red
Black Rumped Flameback	Green	Green	Green
Eurasian Wryneck	Blue	Red	Orange
Brown fronted Woodpecker	Green	Green	Red
Speckled Piculet	Green	Green	Red
Scally bellied Woodpecker	Green	Green	Green
Little Grebe	Green	Green	Green
Slaty headed Parakeet	Green	Green	Red
Rose ringed Parakeet	Green	Green	Green
Spotted Owlet	Green	Red	Red
Indian Eagle Owl	Green	Green	Green
Asian barred Owlet	Green	Green	Green
Indian scops Owl	Orange	Green	Red
Little Cormorant	Red	Red	Red
Great Cormorant	Red	Red	Red
Hair-crested Drongo	Red	Red	Red

Table 3: Diversity Indices of birds of study area.

Diversity Indices	Numbers
Species	230
Population	1099
Dominance	0.00739
Simpson diversity index	0.9926
Shannon diversity index	5.16
Evenness index	0.7608
Margalef/ Richness Index	32.56

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