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Avian Diversity In Naya Raipur: A Study On Habitat Preferences And Conservation Strategies

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Abstract

Naya Raipur, Chhattisgarh's planned capital, is a biodiversity hotspot within a semi-arid landscape, balancing urban development with ecological preservation. This thesis investigates the avian diversity of Naya Raipur, documenting species richness, habitat preferences, seasonal variations, and ecological roles. Field surveys from Jan 2025 to Apr 2025 across wetlands, forests, urban parks, and grasslands recorded bird species, including 30 residents, 15 migrants, and 7 seasonal visitors. Key habitats—Sector 13, Tuta Sector 23, Sector 24, Rakhi Forest, and Sector-27 Park—support diverse avifauna, from ubiquitous house sparrows (*Passer domesticus*) to rare migratory waders like the Using point-count surveys and transect walks, species abundance was recorded. Major threats include urbanization (10% wetland loss), pollution, and habitat fragmentation. Conservation recommendations include wetland restoration, green corridors, and community engagement through birdwatching initiatives. This study underscores Naya Raipur's ecological significance and provides a baseline for future ornithological research and urban conservation planning.

Keywords: Avian diversity, Naya Raipur, Chhattisgarh, habitat preferences, biodiversity indices, conservation, urbanization.

Introduction

Avian species serve as vital indicators of ecosystem health, reflecting shifts in environmental conditions through their behavioral and population trends through their distribution, behavior, and population trends. Significant shifts in avian communities—such as the dramatic reduction in vultures due to veterinary drug exposure—have historically signaled deeper ecological problems. Similarly, changing migratory routes often correspond with broader climatic and habitat transformations.

from an ecological standpoint, birds act as bioindicators. Their presence or absence, abundance, and health reflect the state of the environment. For example, the decline in vulture populations across India due to diclofenac poisoning served as an early warning of environmental toxicity. Similarly, shifts in migratory bird patterns can indicate changes in climate and habitat availability.

Bird diversity is influenced by several environmental factors including vegetation structure, availability of food and water, climate, elevation, and human disturbances. In urban areas, birds respond differently based on their ecological flexibility. Generalist species such as the House Crow (*Corvus splendens*) and Rock Pigeon (*Columba livia*) thrive in built-up environments, while specialists like the Indian Pitta (*Pitta brachyura*) or Painted Stork (*Mycteria leucocephala*) require specific habitat conditions.

This research identifies birds not just by their taxonomy but also by their ecological roles, residency status (resident, migratory, seasonal visitor), and their relationship to the environment. Understanding these dynamics is essential for planning cities that are not only habitable for humans but also inclusive of biodiversity.

Diversity of Birds in Urban Spaces

Urban areas may seem biologically sterile at first glance, but studies worldwide have shown that cities can host surprisingly diverse bird populations, especially in tropical regions. The phenomenon of urban biodiversity is influenced by a combination of factors: habitat heterogeneity, human activity patterns, microclimatic variations, and ecological corridors.

In cities like Delhi, Bangalore, and Pune, over 200 bird species have been recorded due to urban parks, botanical gardens, lakes, and abandoned areas providing habitat diversity. Naya Raipur, though a newer city, follows a similar pattern in design. Green infrastructure—including planned tree-lined roads, rainwater harvesting systems, and lakes—contributes to its capacity to support wildlife.

Avian data were collected through systematic observational methods, including stationary counts at predefined locations and structured walks along designated routes as its main methodology to assess bird diversity. Each bird sighting was noted with species name, count, habitat type, and time of observation. The data was then analyzed to understand:

- Species Richness (S): Total number of species recorded.
- Species Abundance: Total individuals per species and per site.
- Diversity Indices: Using Shannon-Weiner and Simpson's Index to measure species evenness and richness.
- Habitat Preferences: Noting where specific species were most abundant and in what habitat.

The presence of both generalist and specialist species is a strong indicator that the urban green and semi-natural areas in Naya Raipur are playing an essential role in biodiversity conservation. While species like Common Myna and Jungle Babbler are ubiquitous, sightings of migratory waders and forest-dependent birds point to the ecological resilience of these urban ecosystems.

The primary objective of this study was to systematically document the bird species present in the Naya Raipur region during the survey period. It also aimed to analyze the habitat preferences of these avian species across a range of urban, semi-urban, and forested landscapes. Additionally, the research sought to examine seasonal variations in species richness and abundance, thereby highlighting how avifaunal composition changes over time. A further goal was to identify the major threats facing bird populations in the area and to recommend practical conservation measures that could support the sustainability of urban biodiversity in rapidly developing regions like Naya Raipur.

Study Area and Methodology

This chapter outlines the geographical, ecological, and socio-environmental characteristics of the study area—Naya Raipur, Chhattisgarh—and explains the methodology used for data collection, field survey, and analysis of avian diversity. A clear understanding of the study location, its landscape structure, and the observational techniques employed is essential to interpret the findings of this research. The chapter also describes the selection criteria for sites, the temporal framework of data collection, and analytical tools used for interpreting species richness, abundance, and habitat associations.

Naya Raipur, officially known as Atal Nagar, represents a unique blend of planned urban development and preserved natural elements, offering a rich setting for ecological studies. The methodology adopted aligns with standard practices in ornithological research, ensuring accuracy, replicability, and consistency across the study period.

Overview of Naya Raipur

Naya Raipur, located in the Raipur district of Chhattisgarh, India, functions as the state's administrative capital and lies approximately 17 kilometers southeast of the older Raipur city. Covering an area of nearly 237 square kilometers, the city encompasses a combination of urban infrastructure and semi-natural landscapes. Conceived as a sustainable urban center, Naya Raipur was planned with the intention of balancing modern development with environmental stewardship, incorporating abundant green spaces and water features within its residential, governmental, and institutional frameworks. Geographically, the city is situated between latitudes 21.09°N and 21.17°N and longitudes 81.74°E to 81.84°E, and rests at an elevation of about 290 meters above sea level. It experiences a tropical climate marked by hot summers, a monsoon season typically extending from June through September, and relatively cool winters from November to February. Most of the annual rainfall is received during the monsoon months, which gives rise to temporary wetlands and seasonal water bodies that become critical for many bird species during these periods. Ecologically, the region presents a patchwork of diverse habitats, including managed urban parks such as Sector-27 Park, linear roadside plantations, patches of semi-deciduous forest exemplified by Rakhi Forest, seasonal wetlands, open grasslands, and landscaped gardens in residential and institutional areas. This mosaic of environments supports a wide range of avifaunal species, making Naya Raipur an important site for urban biodiversity research.

Selection of Study Sites

The fieldwork for this study was carried out across five strategically selected sites within Naya Raipur, each representing a distinct habitat type to capture the city's ecological variability. These included Sector 13, a government and administrative zone featuring maintained lawns and small water-holding areas; Sector 23 in Tuta, characterized by residential buildings surrounded by patches of native flora and pocket parks; Sector 24, an area with urban roadside plantations and commercial infrastructure; Rakhi Forest, a semi-deciduous forest fragment with protected status and natural undergrowth; and Sector-27 Park, a well-maintained public park that includes landscaped lawns, tree-lined paths, and artificial ponds. These locations were chosen due to their accessibility, habitat complexity, and the presence of both built and green infrastructure, thereby offering a balanced representation of the urban-natural continuum in a modern planned city. Geographically, all study sites lie between 21.09°N and 21.17°N latitude and 81.74°E to 81.84°E longitude. The field study was conducted from January to April 2025, covering both winter and early summer periods. Two standard ecological survey methods were employed to collect avian data: point count surveys, which involved fixed-duration observations at designated locations, and transect walks along 500-meter routes where bird sightings were recorded. Observations included species identification, number of individuals, habitat type, behavioral notes, and geographic coordinates, all logged systematically. The collected data were analyzed using ecological indices such as the Shannon-Wiener Diversity Index and Simpson's Index to assess species diversity, distribution, and dominance patterns across the sites.

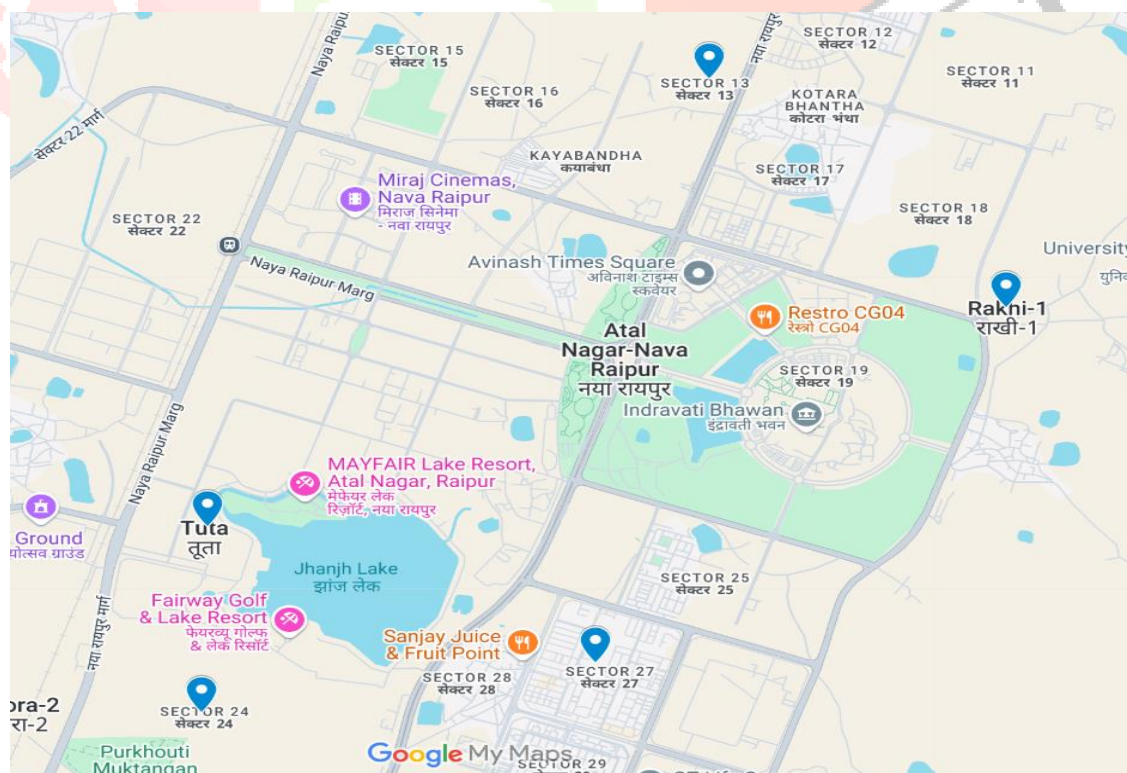


Figure 1. Map showing sampling locations spread across different habitats.

Results and Analysis

Throughout the duration of the study, The study identified 52 distinct avian taxa across surveyed habitats, encompassing resident, migratory, and seasonal populations. distinct bird species were documented across the selected observation sites in Naya Raipur, reflecting a diverse avian population. Out of these, 30 were classified as resident species commonly found year-round, while 15 were identified as migratory birds and 7 as seasonal visitors that appeared during specific climatic phases. The diversity of birdlife was quantified using the Shannon-Wiener Index, which yielded a value of 3.19, indicating a robust and well-balanced species distribution across the region’s varied habitats. Among the surveyed locations, Rakhi Forest stood out as the most biodiverse site, likely owing to its dense vegetation and relatively undisturbed natural setting. Notable species observed in large numbers included the Jungle Babbler, Indian Robin, and Green Bee-eater, which were frequently recorded across different zones. A closer examination of habitat-specific trends revealed that wetland areas supported a variety of aquatic species such as the Cattle Egret, while forested regions provided suitable habitat for birds like the Shikra and the Indian Peafowl. In contrast, urban green spaces such as Sector-27 Park were primarily inhabited by adaptable species including the House Sparrow and the Common Myna. Seasonal fluctuations were evident, with the majority of migratory birds recorded during January and February, while the appearance of summer visitors became more prominent from March onwards. These findings underscore the significance of habitat heterogeneity and seasonal change in shaping bird communities within urban ecosystems like Naya Raipur.

Table 1. site-wise summary of species richness

Site	No. of Species	Dominant Species
Sector 13	8	Common Myna, Indian Robin, Rock Pigeon
Sector 23 (Tuta)	16	Spotted Dove, Ashy Drongo, Green Bee-eater
Sector 24	9	Jungle Babbler, Black Drongo, House Sparrow
Rakhi Forest	15	Shikra, White-throated Kingfisher
Sector-27 Park	4	Red-vented Bulbul, Coppersmith Barbet

Sector 23 (Tuta) had the highest species richness due to its relatively undisturbed forest patch, variety of microhabitats, and availability of food resources and nesting sites.

Table 2 : Avian Species Recorded in Naya Raipur, Chhattisgarh (Jan–Apr 2025)

No.	Common Name	Scientific Name	Number of Individuals
1.	<i>Jungle Babbler</i>	<i>Argya striata</i>	35
2.	<i>Common Babbler</i>	<i>Turdoides caudata</i>	20
3.	<i>White-throated Kingfisher</i>	<i>Halcyon smyrnensis</i>	6
4.	<i>Purple Sunbird</i>	<i>Cinnyris asiaticus</i>	8
5.	<i>Common Hawk-Cuckoo</i>	<i>Hierococcyx varius</i>	7
6.	<i>Indian Robin</i>	<i>Copsychus fulicatus</i>	6
7.	<i>Red-vented Bulbul</i>	<i>Pycnonotus cafer</i>	22
8.	<i>White Wagtail</i>	<i>Motacilla alba</i>	4
9.	<i>Coppersmith Barbet</i>	<i>Psilopogon haemacephalus</i>	4
10.	<i>Eurasian Collared Dove</i>	<i>Streptopelia decaocto</i>	5
11.	<i>Greenish Warbler</i>	<i>Phylloscopus trochilo</i>	3
12.	<i>House Sparrow</i>	<i>Passer domesticus</i>	12

No.	Common Name	Scientific Name	Number of Individuals
13.	Asian Green Bee-eater	<i>Merops orientalis</i>	32
14.	Gray Francolin	<i>Ortygornis pondicerianus</i>	5
15.	Paddyfield Pipit	<i>Anthus rufulus</i>	4
16.	Pied Bushchat	<i>Saxicola caprata</i>	3
17.	Indian Bushlark	<i>Mirafra erythroptera</i>	5
18.	Spotted Dove	<i>Spilopelia chinensis</i>	10
19.	Lesser Whitethroat	<i>Curruca curruca</i>	2
20.	Laughing Dove	<i>Spilopelia senegalensis</i>	13
21.	Scaly-breasted Munia	<i>Lonchura punctulata</i>	2
22.	Taiga Flycatcher	<i>Ficedula albicilla</i>	3
23.	Red-wattled Lapwing	<i>Vanellus indicus</i>	6
24.	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	8
25.	Rose-ringed Parakeet	<i>Psittacula krameri</i>	3

No.	Common Name	Scientific Name	Number of Individuals
26.	Bluethroat	<i>Luscinia svecica</i>	4
27.	Green-winged Teal	<i>Anas carolinensis</i>	4
28.	Shikra	<i>Accipiter badius</i>	10
29.	Large Gray Babbler	<i>Argya malcolmi</i>	5
30.	Plain Prinia	<i>Prinia inornata</i>	12
31.	Green Sandpiper	<i>Tringa ochropus</i>	6
32.	Indian Cuckooshrike	<i>Coracina macei</i>	3
33.	Common Myna	<i>Acridotheres tristis</i>	10
34.	Greater Coucal	<i>Centropus sinensis</i>	3
35.	Pied Kingfisher	<i>Ceryle rudis</i>	12
36.	Common Kingfisher	<i>Alcedo atthis</i>	2
37.	Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	6
38.	Oriental Magpie-Robin	<i>Copsychus saularis</i>	4
39.	Black Drongo	<i>Dicrurus macrocercus</i>	20

No.	Common Name	Scientific Name	Number of Individuals
40.	Little Cormorant	<i>Microcarbo niger</i>	25
41.	Brahminy Starling	<i>Sturnia pagodarum</i>	10
42.	Medium Egret	<i>Ardea intermedia</i>	3
43.	Indian Roller	<i>Coracias benghalensis</i>	32
44.	Bay-backed Shrike	<i>Lanius vittatus</i>	5
45.	Spotted Owlet	<i>Athene brama</i>	4
46.	Brown Shrike	<i>Lanius cristatus</i>	6
47.	Small Minivet	<i>Pericrocotus cinnamomeus</i>	2
48.	Common Sandpiper	<i>Actitis hypoleucos</i>	10
49.	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	3
50.	Tawny Pipit	<i>Anthus campestris</i>	4
51.	Malagasy Pond Heron	<i>Ardeola idae</i>	2
52.	Common Nightingale	<i>Luscinia megarhynchos</i>	3

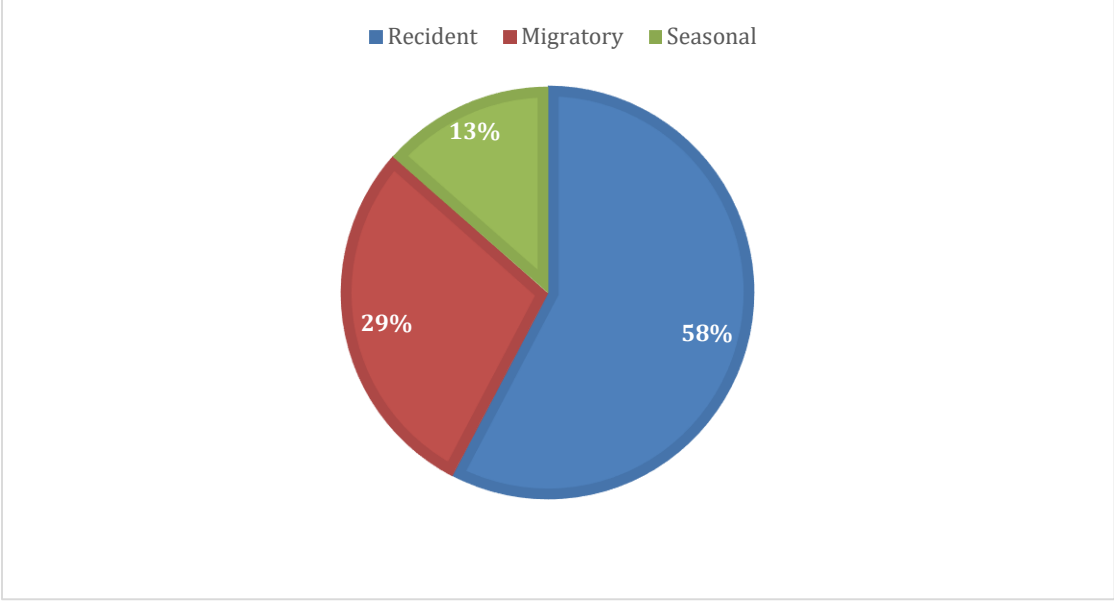


Figure 2. Pie Chart: Migratory vs. resident species vs. Seasonal

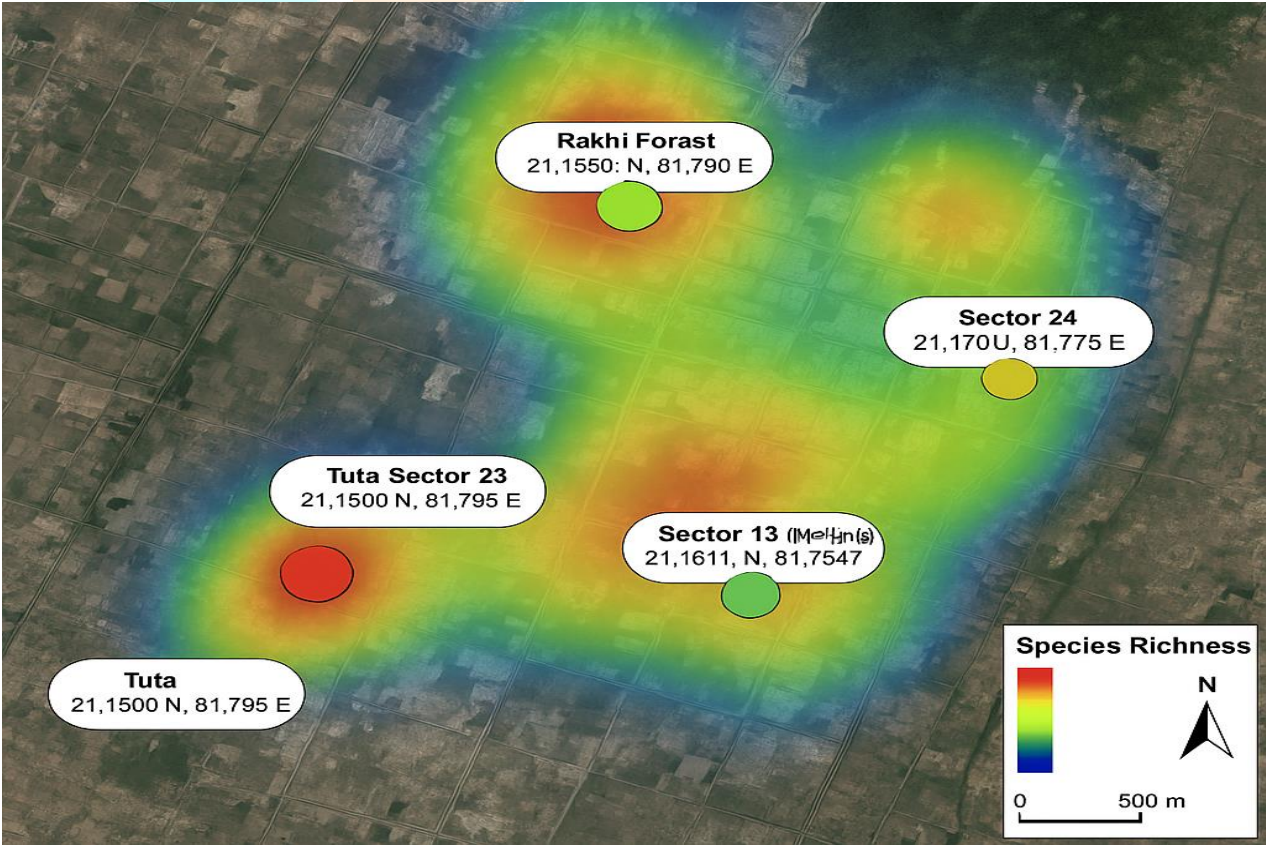


Figure 3. Heat Map: Location-specific richness using GPS coordinates



Fig. Common Sandpiper



Fig . Sykes's Warbler



Fig. Jungle Babbler



Fig. Shikra



Fig. Indian Robin



Fig. Gray Wagtail



Fig. Laughing Dove



Fig. Black Drongo

Figure 4: Bird Species of Naya Raipur

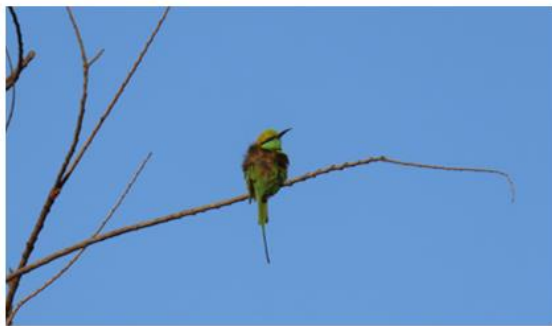


Fig. Asian Green Bee-eater



Fig. Red-wattled Lapwing



Fig. Indian Silverbill



Fig. Eurasian Hoopoe



Fig. Booted Warbler



Fig. White-throated Kingfisher



Fig. Small Minivet

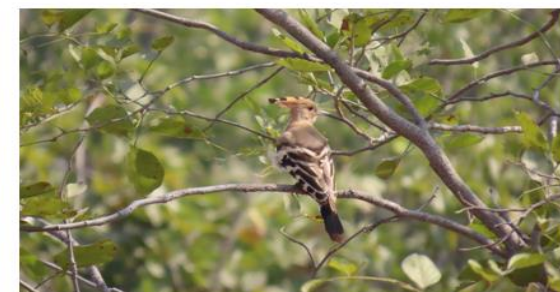


Fig. Eurasian Hoopoe

Figure 5: Bird Species of Naya Raipur



Fig. Pied Bushchat



Fig. White Wagtail



Fig. Bay-backed Shrike



Fig. Eurasian Collared-Dove



Fig. Spotted owlet



Fig. Asian Green Bee-eater



Fig. Medium Egret



Fig. Little Cormorant

Figure 6: Bird Species of Naya Raipur



Fig. Red-vented Bulbul



Fig. Pied Kingfisher



Fig. Booted Warbler



Fig. Indian Roller

Figure 7: Bird Species of Naya Raipur

Discussion

This research demonstrates that planned urban environments such as Naya Raipur possess the capacity to support diverse bird communities, contingent on the preservation of green infrastructure if green spaces and wetlands are maintained. The Rakhi Forest emerged as a key refuge, while urban parks offered habitat to generalist species. Human activities such as construction and pollution are notable threats. Importantly, the presence of migratory and sensitive species indicates a high ecological value of the region's green infrastructure.

Conservation Recommendations

Effective conservation of urban bird diversity in Naya Raipur requires a multi-faceted approach that considers ecological, policy, social, and research dimensions. Restoration of wetland habitats is essential, particularly through measures aimed at reducing pollution and reestablishing native aquatic vegetation. Equally important is the formal protection of forest patches like Rakhi Forest, which serve as critical biodiversity refuges within the urban matrix. Enhancing urban green spaces with bird-friendly plant species, such as native flowering and fruit-bearing trees, can improve the ecological value of parks and public areas. From a policy standpoint, integrating biodiversity impact assessments into the city's developmental planning process would help minimize ecological disruptions before construction begins. Urban planning should also promote environmentally innovative practices such as installing green roofs and developing vertical gardens, which add microhabitats and reduce ecological fragmentation. Community involvement plays a vital role in long-term

conservation efforts. Activities like organizing local birdwatching groups, installing informative signage in public areas, and encouraging participation in citizen science projects can help raise awareness and foster stewardship among residents. Furthermore, consistent and scientifically rigorous monitoring programs using visual surveys and acoustic tools should be established to track changes in bird populations over time. Collaborations with academic institutions and environmental organizations can strengthen these efforts by providing technical expertise, funding support, and capacity-building for long-term ecological research and adaptive conservation planning.

Conclusion

The results of the study clearly demonstrate that urban environments like Naya Raipur are capable of supporting considerable bird diversity, particularly when natural elements such as wetlands and green corridors are preserved and effectively managed. Among the surveyed areas, Rakhi Forest played a crucial role as a sanctuary for a wide range of bird species, offering relatively undisturbed habitat conditions. In contrast, urban parks served as habitats for more adaptable and widespread species that thrive in human-modified landscapes. Despite this potential for ecological balance, ongoing anthropogenic pressures—especially unregulated construction and environmental pollution—pose serious risks to habitat quality. Notably, the consistent presence of both migratory birds and ecologically sensitive species highlights the region's substantial ecological value and underscores the importance of safeguarding its remaining green spaces to maintain biodiversity within a rapidly urbanizing setting.

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