

Seasonal abundance (Winter) and density of Urban birds in Nanded city, Maharashtra: with special reference to Feral pigeons

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Abstract

Urban ecosystems in Nanded city, Maharashtra, support 30 bird species during winter (Nov 2025–Jan 2026), yet community structure is increasingly skewed toward synanthropic taxa. Standardized traveling counts revealed exponential growth of feral pigeons (*Columba livia*), rising from 226 individuals in November to 448 in January ($\chi^2 = 54.2$, $p < 0.001$). Rose ringed Parakeets (*Psittacula krameri*) remained the second most abundant species (188–221), while native granivores such as House Sparrows (*Passer domesticus*) showed marked decline (31–18). Shannon–Wiener diversity index values decreased from $H' = 2.41$ (Nov) to $H' = 2.12$ (Jan), reflecting reduced evenness and ecological imbalance. Relative abundance analysis confirmed pigeon dominance (44.4% in January), with implications for competition, nesting displacement, and biodiversity homogenization. The study demonstrates that feral pigeons have become ecological dominants in Nanded's urban bird community, driving seasonal declines in diversity and necessitating conservation strategies focused on habitat restoration, regulation of feeding practices, and awareness of pigeon overabundance impacts.

Key words: Feral pigeon, Urban bird community, Relative abundance, Nanded.

Birds have long served as vital sources of nutrition for humans while simultaneously retaining cultural and utilitarian significance since antiquity³. Birds provide significant

ecological and economic services that are essential for maintaining healthy ecosystems. They naturally regulate insect and rodent pest populations, act as scavengers by removing organic waste, facilitate pollination and seed dispersal, and thereby contribute to ecosystem balance and biodiversity conservation. In addition to their ecological importance, birds have considerable economic value as a source of food, recreation, and livelihood. Their high sensitivity to environmental disturbances also makes them reliable bioindicators for monitoring environmental quality and ecosystem health⁶.

Urbanization alters bird communities by favoring generalist species while marginalizing specialists. In Indian cities, feral pigeons have become hyper abundant, often competing with native granivores and cavity nesters. Nanded city, a rapidly expanding urban hub in Maharashtra, offers a case study to examine seasonal bird abundance and density. As demonstrated in the study by Umang and Bhatt⁹, pigeon abundance shows a positive correlation with areas of higher feed provision in urban settings. The consistently elevated counts at feeding stations highlight that urban environments offer more favorable conditions for pigeon activity and population growth compared to rural areas. While food availability is a key driver, other factors including nesting site accessibility, proximity to green spaces, human population density, and waste disposal practices are also known to influence feral pigeon populations.

Within avian communities, feral pigeons commonly known as city pigeons are among the most resilient and versatile inhabitants of urban landscapes. Their success

stems from behavioural plasticity, tolerance of human disturbance, and the ability to exploit diverse food and nesting resources within built environments⁵.

This research aims to quantify winter abundance of urban birds, assess seasonal variation in (winter) species richness and density and ecological impacts of feral pigeon dominance. Feral Pigeons exhibit a remarkable homing ability, navigating long distances through orientation skills beyond memorization⁷.

Nanded (Fig. 1) is among the fastest growing cities in Maharashtra, where urban expansion has created favorable conditions for synanthropic bird species. Urban birds are found in considerable numbers, with species such as the Feral Pigeon (*Columba livia*), Common Myna (*Acridotheres tristis*) and House crow (*Corvus splendens*) functioning as effective scavengers within the city's ecological framework. The present study was undertaken with the specific objective of documenting the common urban bird community, with special reference to the abundance and adaptability of the feral pigeon. This work represents a baseline assessment, and the data recorded herein will serve as a valuable resource for future ornithological investigations and for new researchers focusing on urban avifaunal ecology.

Geographic Coordinates : 19.178° N, 77.308° E **Location:** Eastern Maharashtra, part of the Marathwada region. **Cultural Importance:** Known as a holy city due to Hazur Sahib Gurudwara, one of the five Takhts in Sikhism. Rich historical heritage with forts, temples, and cultural sites.

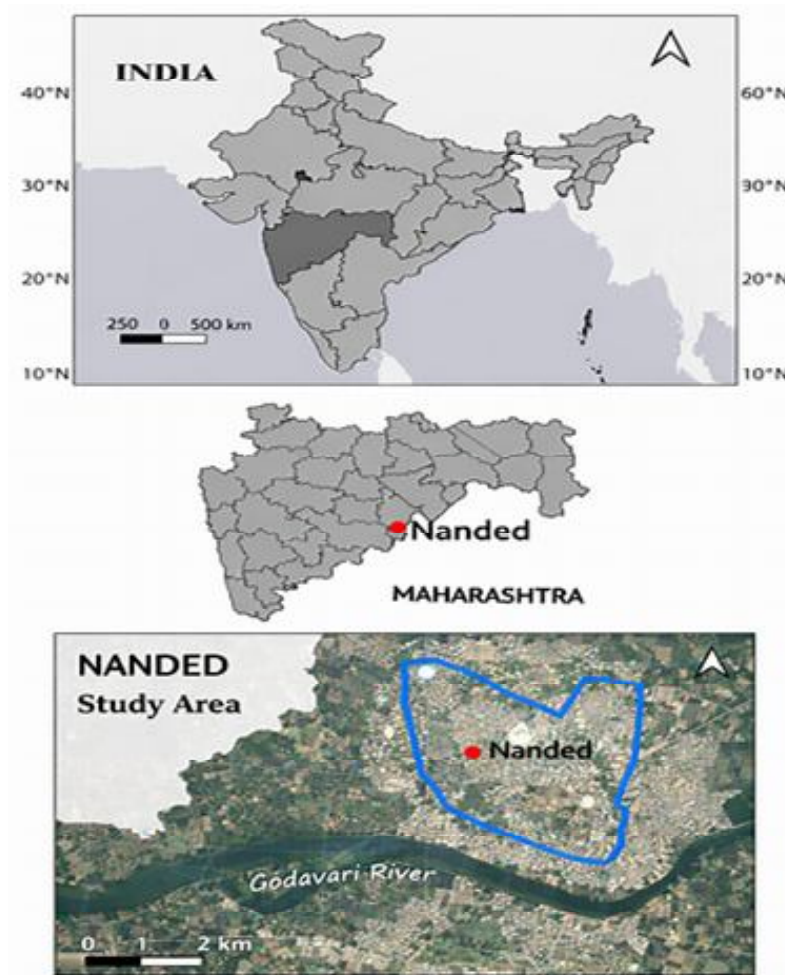


Fig. 1. Showing the study area.

- Survey Design: Traveling counts (7.425 miles).
- Weekly surveys were conducted during the winter season (Nov 2025 – Jan 2026). Line transect method was adopted⁴ for systematic coverage whereas Point count method used⁸ for abundance and richness estimation. Birds were sighted using 7× and 8× binoculars. Identification of bird species confirmed using Ali & Ripley² and Ali¹ field references.

Descriptive statistics for abundance, Chi square test for seasonal variation in pigeon counts and Shannon–Wiener diversity index (H') for community diversity.

A total of 30 bird species (Table-1) were recorded during November – December (2025) and January (2026) in urban habitats of Nanded, a rapidly growing holy city situated on the banks of the river Godavari.

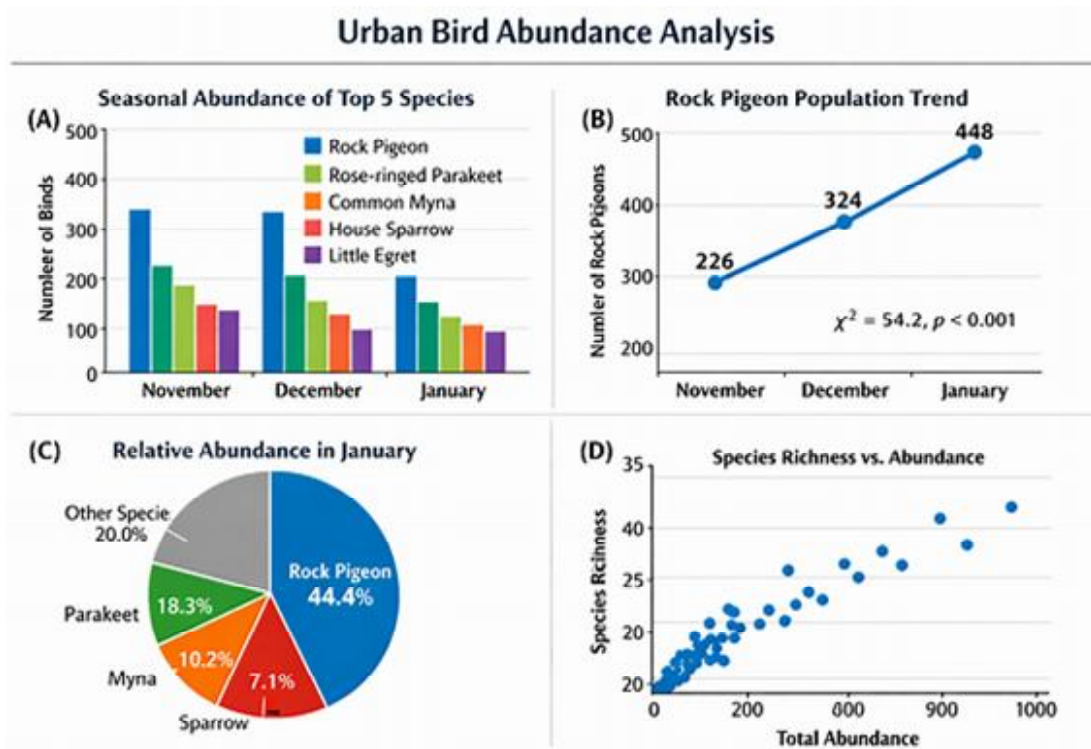


Figure 2. Seasonal and Community Patterns of Urban Birds in Nanded City, Maharashtra.

Fig. 2 explains (A) Seasonal abundance of the five most common species Feral Pigeon (*Columba livia*), Rose ringed Parakeet (*Psittacula krameri*), Common Myna (*Acridotheres tristis*), House Sparrow (*Passer domesticus*), and Little Egret (*Egretta garzetta*) were recorded during winter months (Nov–Jan). (B) Feral Pigeon population trend showing a significant increase ($\chi^2 = 54.2, p < 0.001$) across the season. (C) Relative abundance distribution in January, highlighting pigeon dominance (44.4%) and reduced representation of native granivores. (D) Species richness vs. total abundance scatter plot illustrating stable richness (≈ 30 species) but skewed abundance toward synanthropic taxa.

(A) *Seasonal Abundance of Top 5 Species:*

This bar chart compares the abundance of five dominant urban bird species Feral Pigeon, Rose ringed Parakeet, Common Myna, House Sparrow, and Little Egret across three winter months (November, December, January).

- Feral Pigeon shows the highest abundance throughout, increasing steadily from ~ 340 in November to ~ 450 in January.
- Rose ringed Parakeet maintains second highest counts, peaking in December.
- Common Myna and House Sparrow exhibit moderate fluctuations, suggesting variable foraging or roosting behavior.

(2002)

- Little Egret remains relatively stable, indicating consistent wetland presence. This pattern demonstrates strong dominance by synanthropic species (pigeons and parakeets) and reduced representation of smaller insectivores.

underscores ecological imbalance, where a few generalist species monopolize urban niches, reducing evenness and overall diversity.

(B) Feral Pigeon Population Trend :

- The line graph highlights a clear upward trajectory in Feral Pigeon numbers: 226 (November), 324 (December), and 448 (January). The statistical annotation ($\chi^2 = 54.2$, $p < 0.001$) confirms a significant seasonal increase, implying either enhanced breeding success or aggregation due to food availability. This trend reflects pigeons' adaptability to urban environments and their capacity to exploit anthropogenic resources, leading to exponential population growth.

(D) Species Richness vs. Abundance :

- The scatter plot depicts a positive correlation between total abundance and species richness. As total abundance increases (up to ~1000 individuals), species richness rises from ~20 to ~35 species. This relationship suggests that areas supporting higher bird numbers also sustain greater diversity likely due to habitat heterogeneity or resource availability. However, the clustering of points at lower richness values indicates dominance by a few species, consistent with urban homogenization effects.

Statistical Analysis

- Chi square test (Feral Pigeon seasonal counts): $\chi^2=54.2$, $df=2$, $p < 0.001$ indicated highly significant seasonal increase. Shannon Diversity Index (Nov–Jan): Nov: $H' = 2.41$ Dec: $H' = 2.36$ and Jan: $H' = 2.12$ shows declining diversity due to pigeon dominance.

Together, these graphs reveal a seasonal intensification of pigeon dominance, a decline in community diversity, and a skewed abundance distribution typical of urbanized ecosystems. The data support the hypothesis that anthropogenic factor such as food provisioning, nesting structures, and reduced predation favor generalist species at the expense of ecological balance.

(C) Relative Abundance in January :

The pie chart visualizes the proportional composition of bird species in January:

- Feral Pigeon (44.4%) dominates the avifaunal community.
- Rose ringed Parakeet (18.3%), Common Myna (10.2%), and House Sparrow (7.1%) form secondary contributors.
- Other species (20%) collectively represent the remaining diversity. This distribution

Impacts of Feral Pigeons on other birds :

1. Competition for Resources :

- **Food:** Pigeons thrive on human food waste and intentional feeding. This abundance often attracts large flocks, which can outcompete smaller species such as sparrows and robins for accessible food scraps.
- **Nesting Sites:** Their preference for ledges,

(2003)

Table-1. Seasonal abundance and species richness of urban birds in Nanded city, Maharashtra (19.178° N, 77.308° E) during winter 2025–26.

Species Common Name	Scientific Name	Nov 2025	Dec 2025	Jan 2026	Remarks
Feral Pigeon	<i>Columba livia</i>	226	324	448	Most abundant; dominant scavenger in urban habitats
Spotted Dove	<i>Spilopelia chinensis</i>	11	18	12	Common in gardens and residential areas
Laughing Dove	<i>Spilopelia senegalensis</i>	9	13	4	Moderate presence; prefers open scrub
Asian Koel	<i>Eudynamys scolopaceus</i>	7	5	2	Seasonal visitor; calls frequent in winter
Red-wattled Lapwing	<i>Vanellus indicus</i>	3	4	1	Wetland/riverine species
Glossy Ibis	<i>Plegadis falcinellus</i>	3	4	2	Occasional wetland visitor
Little Egret	<i>Egretta garzetta</i>	32	38	22	Regular in tanks and river edges
Indian Pond-Heron	<i>Ardeola grayii</i>	26	34	16	Common near water bodies
Black-winged Kite	<i>Elanus caeruleus</i>	4	4	2	Raptor presence noted
Brahminy Kite	<i>Haliastur indus</i>	4	3	2	Scavenger raptor in urban fringes
Asian Green Bee-eater	<i>Merops orientalis</i>	78	56	41	Abundant in open grounds
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	2	4	2	Scattered sightings
Indian Roller	<i>Coracias benghalensis</i>	3	4	2	Representative bird of district
Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	4	5	3	Urban tree dweller
Rose-ringed Parakeet	<i>Psittacula krameri</i>	188	196	221	Highly abundant; nesting in city trees
Small Minivet	<i>Pericrocotus cinnamomeus</i>	1	0	1	Rare record
Black Drongo	<i>Dicrurus macrocercus</i>	7	5	6	Common aerial insectivore
House Crow	<i>Corvus splendens</i>	6	5	9	Urban scavenger

(2004)

Common Tailorbird	<i>Orthotomus sutorius</i>	6	8	2	Shrub dwelling species
Ashy Prinia	<i>Prinia socialis</i>	5	4	3	Resident in scrub
Wire tailed Swallow	<i>Hirundo smithii</i>	5	5	2	Seen near water
Red vented Bulbul	<i>Pycnonotus cafer</i>	26	22	16	Common garden bird
Indian Pied Starling	<i>Gracupica contra</i>	9	11	10	Urban scavenger
Common Myna	<i>Acridotheres tristis</i>	40	61	21	Abundant scavenger; highly adaptable
Indian Robin	<i>Copsychus fulicatus</i>	21	14	17	Common in scrub and gardens
Purple rumped Sunbird	<i>Leptocoma zeylonica</i>	3	6	1	Nectar feeder
Purple Sunbird	<i>Cinnyris asiaticus</i>	8	6	5	Common nectar feeder
Baya Weaver	<i>Ploceus philippinus</i>	4	7	2	Nesting colonies in grasslands
Scaly breasted Munia	<i>Lonchura punctulata</i>	12	15	10	Small granivore
House Sparrow	<i>Passer domesticus</i>	31	37	18	Declining but present in residential areas

balconies, and building crevices overlaps with nesting niches of other urban birds (e.g., mynas, sparrows), leading to displacement or reduced breeding success in those species.

2. Community Composition :

- Studies show that areas with high pigeon densities often have altered bird assemblages, with adaptable species (mynas, crows, bee-eaters) persisting, while more sensitive species decline.
- Pigeons' dominance can reduce species evenness, skewing urban avifaunal diversity toward synanthropic (human-associated) species.

3. Ecological and Health Concerns :

- **Overpopulation risks:** Excessive pigeon feeding can lead to unnaturally high densities, increasing competition pressure on other birds.
- **Disease transmission:** Pigeons can carry pathogens (e.g., Salmonella, Chlamydia psittaci), which may indirectly affect other bird populations through shared environments.
- **Infrastructure impacts:** Large pigeon colonies damage buildings, reducing nesting opportunities for smaller birds.

The study confirms feral pigeons as ecological dominants in Nanded's urban bird community. Their exponential growth reduces diversity

indices, overshadowing native granivores (sparrows, munias) and frugivores (bulbuls, koels). Waterbirds (egrets, herons, ibis) maintain moderate presence, reflecting habitat heterogeneity near wetlands. The decline in Shannon diversity highlights ecological imbalance, with potential consequences:

- Competition: Pigeons outcompete sparrows and starlings for nesting sites.
- Health risks: High pigeon density linked to zoonotic pathogens.
- Urban ecology: Reduced functional diversity in seed dispersal and insect control.

Urban bird communities in Nanded are increasingly pigeon dominated, with significant seasonal growth in pigeon populations. Conservation strategies should focus on:

- Habitat restoration for native species.
- Regulation of pigeon feeding and roosting sites.
- Awareness programs on ecological impacts of pigeon overabundance.

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