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Assessment of avian diversity of green patches in Amravati City, Maharashtra, India

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Abstract
Urban green spaces serve as critical habitats for sustaining bird diversity in rapidly developing cities. This study investigated the seasonal diversity of birds in green patches of urban Amravati, Maharashtra, India. Over a two-year survey period (2023-2025), 141 avian species were recorded using grid surveys, patch monitoring, and point transects. This study provides the first comprehensive checklist of urban birds in Amravati City. Most species were residents, with limited migratory activity. Notably, the Vulnerable (VU) Asian woolly necked stork and Near Threatened (NT) Alexandrine Parakeet, *European Roller* was recorded. High Simpson (1-D=0.9842) and Shannon (H=4.456) diversity indices reflect ecological richness. A total of 41 bird species were observed using a variety of nesting substrates, including trees and anthropogenic structures such as walls and buildings near green spaces. Key urban roosting sites for parakeets, crows, and egrets were identified, highlighting the ecological role of green patches in Amravati City. Additionally, a checklist of 54 plant species, predominantly trees was documented across various urban habitats of Amravati City, many of which support avian nesting, foraging, and shelter. Conservation of native tree species and green corridors is recommended to sustain avian biodiversity throughout urban expansion.

Keywords: Amravati City, Maharashtra, India, Urban landscape, diversity, green patches, birds

Introduction
Urban green patches, such as parks, institutional campuses, botanical gardens, and open patches, are increasingly recognized as vital elements in maintaining biodiversity within cities. These spaces not only enhance human well-being and quality of life but also provide critical habitats for urban wildlife, particularly birds. Green areas serve as ecological refuges that offer food, shelter, and breeding grounds for avifauna, while also functioning as habitat corridors that connect fragmented landscapes. In cities like Amravati and Maharashtra, where rapid urbanization is leading to habitat loss and degradation, these green patches play a vital role in sustaining avian populations.

Previous studies in India have highlighted the decline in avian populations due to the loss of nesting sites and food plants. The availability of safe nesting locations is crucial for successful breeding. Many bird species, especially cavity nesters such as barbets, hornbills, and owls, depend on mature trees with natural hollows. These birds often face a trade-off between excavating new cavities and reusing old ones, a decision influenced by predation risk, competition, and resource availability.

India ranks among the richest countries in avian diversity, with approximately 1,373 bird species, accounting for nearly 13% of the global avifauna. The bird fauna of India spans 114 families out of the 249 recorded globally, reflecting its ecological richness. Within India, the state of Maharashtra harbors over 577 species (Kasambe, 2016) [31], with earlier reports listing 556 species. The Vidarbha region, located in eastern Maharashtra, supports approximately 417 species, while the Amravati district alone records 392 species (Wadatkar et al., 2016) [31]. Amravati, located within this semi-arid zone, includes a variety of green spaces and riverine habitats that sustain diverse resident and migratory bird populations. While several regional checklists (e.g., Wadatkar et al., 2016; Wagh, 2020) [31, 38,] have documented the area's avifauna, no study has comprehensively addressed the seasonal patterns of bird diversity and nesting ecology within Amravati city's green spaces.

Considering this gap, the present study was undertaken to document avian diversity and analyze the habitat preferences of birds in Amravati's urban green patches. Emphasis is placed on tree species associations with the aim of assessing how urban pressures shape avian ecology. The outcomes of this research are expected to provide valuable inputs for conservation planning and biodiversity-sensitive urban development.

Material and Methods

- **Study Area:** The present study was conducted across diverse green patches within Amravati City and its surrounding regions, encompassing urban parks, institutional campuses, government office campuses, privately maintained green areas, and open lands surveyed from September 2023 to June 2025. Amravati, the second-largest city in the Vidarbha region of Maharashtra and the administrative headquarters of Amravati District, is geographically located at approximately 20.9374° N latitude and 77.7796° E longitude, with an average elevation of 343 meters. Covering around 183.5 km², the city lies 156 km west of Nagpur and features a tropical wet and dry climate characterized by hot, dry summers, a monsoon season from July to October, and mild to cool winters. With average annual rainfall between 800 and 1000 mm and temperature ranging from 10°C in winter to 44°C in summer, Amravati's varying humidity (10-95%) highlights the ecological significance of its green spaces in maintaining environmental balance and urban sustainability amid rapid urbanization (Map 1).
- **Monitoring and Data Analysis:** This study employed a combination of systematic survey techniques and observational methods to assess avian diversity across various urban green patches and landfill sites in Amravati City from September 2023 to June 2025. The methodology included grid surveys for structured spatial sampling, weekly patch monitoring during peak bird activity hours using bird identification apps such as eBird and Merlin, fixed-point transects for accurate population estimates, and randomized surveys to capture uncommon species. Vegetation sampling and feeding behaviour observations were conducted to understand the availability of food resources and their impact on bird habitats. Roosting and nesting behaviours were documented to assess habitat preferences and adaptations in response to urbanization. Additionally, surveys in landfill areas have evaluated the effects of urban waste on bird populations. Conservation awareness programs were also organized to engage local communities. Key materials included Nikon cameras with Lenses, binoculars, GPS-enabled mobile applications, and authoritative bird identification guides such as Ali and Ripley (1987) [1]. Checklist of Birds of Amravati District, Wadatkar et al. (2016) [31]. Wetland and Water Birds of Amravati Region, Wagh GA (2020) [38].
- Avian diversity was assessed using the Shannon-Weiner index and Simpson's diversity index, incorporating species richness (S) and evenness (Pi). The Shannon Index (range: 1-3) indicates diversity based on species count and abundance, whereas Simpson's index (range: 0-1) measures the likelihood that two randomly selected individuals are from different species. These indices facilitated comparisons of ecological variability across green spaces in Amravati. The study area map was constructed using QGIS.

Results and Discussion

The study was conducted across 16 different sites representing a variety of green spaces and urban landscapes within Amravati City. This study presents the first comprehensive checklist of avian species in the urban green spaces of Amravati, documenting 141 bird species across various habitats (Table 1). These findings offer detailed insights into feeding habits and ecological roles within the cityscape. The majority of the observed species were resident birds, with no migratory species recorded, indicating stable year-round nesting and roosting conditions in the study area. The dominance of resident birds suggests that Amravati's green patches provide essential habitat resources amidst urbanization.

The families Passeridae and Sylviidae exhibited the highest diversity, each comprising 14 species, followed closely by Muscicapidae with 13 species. Other notable families included Corvidae (9 species), Accipitridae (7 species), and Phasianidae (7 species). Several families, such as Pittidae, *Cisticolidae*, *Pycnonotidae*, *Columbidae*, and *Caprimulgidae*, were represented by only a single species, indicating an uneven distribution of species richness among families. These patterns may reflect differences in ecological requirements, habitat preferences, or taxonomic classification.

The green spaces supported a wide range of bird families, playing varied ecological roles. Psittacidae (parrots) were represented by species such as the Alexandrine Parakeet and Rose-ringed Parakeet. Nocturnal raptors from Strigidae and Tytonidae, including owls such as Spotted Owlet and Barn Owl, contributed to rodent control. Urban adapted pigeons and doves (Columbidae) like Rock Pigeon and Laughing Dove were common and served as prey for raptors (Accipitridae and Falconidae). Passerine birds, such as House Sparrow, Red-vented Bulbul, Jungle Babbler, and Oriental Magpie Robin, thrived across natural and modified habitats. Functional diversity was also notable, with woodpeckers (Picidae) contributing to forest health and flycatchers (Muscicapidae) known for active foraging and melodious calls.

Of the 141 expected species, 112 (approximately 80%) were recorded year-round, indicating a stable resident avifauna. Winter migrants constituted 25 species (17.5%), representing a significant seasonal influx, whereas breeding migrants were fewer (4 species, 3%), reflecting the limited use of the area for breeding migration (Figure 2). Resident birds formed the majority, highlighting their adaptation to local conditions, whereas migrants contributed to seasonal biodiversity dynamics.

Dietary analysis (Figure 3) demonstrated the dominance of insectivorous birds (57%), followed by granivores (15%), and carnivores (11%). Piscivores accounted for 5%, with omnivores, frugivores, and nectarivores each comprising approximately 4%. Common granivores include Eurasian Collared Dove, House Sparrow, and Scaly-Breasted Munia, which are indicative of seed availability. Insectivores, such as the Greater Coucal and Indian Paradise Flycatcher, reflected abundant insect populations supported by vegetation and water sources. Frugivores like the Coppersmith Barbet and Indian Grey Hornbill suggested the presence of fruit-bearing

flora vital for seed dispersal. Nectarivores, including Purple Sunbird species, depend on flowering plants, emphasizing floral diversity. Carnivorous species, such as Shikra and Black Kite, highlighted a healthy predator-prey balance. Piscivores such as the Indian Pond Heron and White-Throated Kingfisher indicated the importance of aquatic habitats in sustaining biodiversity. Omnivores, such as Indian Grey Hornbill and House Crow, have demonstrated dietary flexibility that facilitates survival in varied environments.

The alpha diversity indices demonstrated a rich and balanced avian community within Amravati's urban green spaces. A total of 141 species were recorded, with 1182 individual birds observed, indicating substantial species richness and a thriving population. Simpson's Diversity Index (1-D=0.9842) and a low dominance value (D=0.01576) revealed a highly diverse ecosystem without dominance by any single species. Similarly, the Shannon-Weiner Index (H=4.456) and Evenness Index (0.6287) reflected high biodiversity and a moderately even species distribution, highlighting the capacity of urban habitats in Amravati to sustain a diverse and balanced bird community (Table 2). Among the recorded avian species, the most abundant was the Rock Pigeon (*Columba livia*), which showed a high level of adaptation to urban environments.

Among the 141 species, the Asian Woolly necked Stork (*Ciconia episcopus*) was previously considered Least Concern, but due to a declining population trend, it was upgraded to Vulnerable (VU) by the IUCN Red List. The main reasons for this decline include nesting sites, habitat destruction, human disturbance, and changes in wetland ecosystems. However, two species, the Alexandrine Parakeet (*Psittacula eupatria*) and European Roller (*Coracias garrulus*), were categorized as Near Threatened (NT) (Fig. 4), suggesting a potential decline in their population due to factors such as habitat loss. The vast majority, comprising 138 species, are classified as Least Concern (LC) under the IUCN Red List, indicating a stable population with no immediate threats. This highlights the need for conservation efforts to ensure the protection and sustainability of this species in the region.

This study identified three prominent roosting sites within the urban green patches of Amravati City and showed their ecological importance for urban bird communities. The first site, located at the Rajapeth Police Station (Lat: 20.923591°N, Long: 77.753798°E), supports two parakeet species that use nearby trees and structures for evening roosting. The second site, situated within the Tapowan Campus near Amravati University (Lat: 20.949195°N, Long: 77.801432°E), is primarily used by House Crows. Additionally, the Old Wadali Garden (Lat: 20.927545°N, Long: 77.793526°E) serves as a significant roosting site for egrets, utilizing tall trees within the garden premises for communal roosting and nesting. These roosting sites reflect the adaptability of certain bird species to urban habitats and highlight the role of green spaces in supporting avian ecological functions. These sites offer essential shelter, protection, and social interaction opportunities, aiding bird adaptation and survival in urban landscapes.

The survey documented 54 tree species from urban parks, gardens, campuses, roadside plantations, and residential areas of Amravati City. Among these, native species such as *Ficus religiosa* (Peepal), *Ficus benghalensis* (Banyan), *Azadirachta indica* (Neem), *Bombax ceiba* (Katesawar), and *Butea monosperma* (Palas) were frequently associated with bird activity, including nesting and foraging. The study revealed that indigenous trees are more commonly used for nesting than exotic species. (Table 3).

During the study period, 41 bird species were recorded nesting in various habitats within Amravati City. Of these, 26 species were found nesting trees, including raptors, hornbills, doves, and owls. Cavity-nesting was particularly common among species like the Indian Grey Hornbill (*Ocyceros birostris*), Indian Scops Owl (*Otus bakkamoena*), Spotted Owlet (*Athene brama*), and Rose-ringed Parakeet (*Psittacula krameri*). Ten species, such as the Rock Pigeon (*Columba livia*), were noted nesting in wall crevices, windows of tall buildings, or under building roofs, demonstrating strong adaptation to human-made structures. Ground-nesting behavior was documented in species such as the Red-wattled Lapwing and White-breasted Waterhen (*Amaurornis phoenicurus*), which preferred bushes near wetlands or roadside gardens. Shrub and low-branch nesting was observed in species like the Tailorbird and Purple Sunbird. These observations indicate the variety of nesting strategies adopted by birds in urban environments (Table 4).

Bird species diversity is closely linked to habitat quality, particularly vegetation cover, and is adversely affected by anthropogenic activities. Field observations indicate that bird diversity increases in areas with dense vegetation, such as shrublands, woodlands, and forests, while it declines in farmlands and urban settlements due to land-use changes and vegetation clearing.

Urban green spaces, even small patches with varied vegetation and water resources, can sustain significant avian diversity. The presence of trees, especially native species, is a critical factor in supporting nesting and roosting activities of birds in urban landscapes. Cavity-nesting species such as woodpeckers, Myna, Owls, and hornbills rely on large mature trees or existing cavities, making them particularly vulnerable to habitat loss. Although generalist species like the Rock Pigeon and Common Myna thrive in disturbed habitats, the occurrence of species like Baya Weaver and Long-tailed Shrike suggests the presence of suitable microhabitats within the city. Roosting observations in Amravati revealed that minimally disturbed areas with large trees support communal roosts for species such as parakeets and crows, underscoring the need for targeted habitat protection. The study recommends planting native tree species in cities, such as *Ficus benghalensis* (Banyan), *Ficus religiosa* (Pimpal), *Azadirachta indica* (Neem), *Syzygium cumini* (Jamun), *Tectona grandis* (Teak), *Ailanthus excelsa* (Maharukh), and *Bombax ceiba* (Katesawar), as they support urban bird communities by offering essential resources, such as nesting sites, roosting spaces, nectar, and fruits.

House Sparrows (*Passer domesticus*) were frequently observed nesting in the crevices of under-constructed building walls, a behaviour well-documented in urban environments (Ali & Ripley, 1987; Mehta et al., 2014) [1, 20]. Additionally, a notable preference was recorded for roosting in lemon trees (*Citrus Limon*) and Babul (*Acacia nilotica*), likely due to the dense foliage and thorny structure offering enhanced protection from predators and environmental stressors (Bhattacharya et al., 2011; Singh et al., 2018) [5, 25].

The Rock Pigeon (*Columba livia*), once restricted to cliffs and rocky outcrops, has become one of the most widespread avian species in urban landscapes across the globe, including Indian

cities (Johnston & Janiga, 1995) [15]. Their remarkable adaptability to city environments is attributed to their abundant food availability, nesting opportunities in buildings, and absence of natural predators. This synanthropic behaviour has led to a sharp rise in urban populations (Sol et al., 2013). Urban occupation by Rock Pigeons presents several ecological and public health concerns. Large congregations near human dwellings can lead to the accumulation of droppings, which damage infrastructure owing to their acidic nature (Haag-Wackernagel, 1995) [13]. Additionally, pigeons are carriers of zoonotic pathogens, such as *Chlamydia psittaci*, *Salmonella spp.*, and *Cryptococcus neoformans*, posing a risk to human health (Haag-Wackernagel & Moch, 2004) [14].

From an ecological perspective, overpopulations of pigeons can displace native bird species through competition for nesting sites and food resources (Soldatini et al., 2006) [27]. Their dominance may contribute to the homogenization of urban avifauna, reducing overall avian diversity. Managing Rock Pigeon populations requires humane, eco-friendly methods such as installing nets or spikes to deter roosting. Regulating public feed and improving waste management can limit food availability. Reproductive control using contraceptive feed, such as nicarbazin, also helps reduce overpopulation (Avery et al., 2008) [4].

Urban landscape vegetation plays a vital role in maintaining bird diversity by offering essential resources, such as nesting sites, food, and shelter. Native tree species such as Ficus religiosa, *Syzygium cumini*, *Azadirachta indica*, and *Mangifera indica* are frequently used by cavity-nesting and frugivorous birds, whereas adaptable species such as House Sparrow utilize building crevices. The coexistence of native and ornamental trees supports a wide range of species across nesting guilds. These findings highlight the need to preserve native trees and structurally diverse habitats in urban planning to ensure avian conservation (Aronson et al., 2014) [3]. Threats such as urbanization, pollution, electrocution, glass collisions, invasive species, and pesticide use further exacerbate population decline, especially among insectivorous and migratory birds. Climatic fluctuations, especially during the winter months, also influence species richness and abundance. Conservation measures, including planting native trees, protecting existing green spaces, regulating pollutants, and engaging communities in citizen science initiatives, are essential for sustaining avian diversity in urban areas. With over 60 species known to breed in urban environments such as Swiss cities, urban landscapes offer critical refuge for birds, although they cannot replace the conservation value of wild habitats. Integrative and sustainable urban planning is vital for creating ecologically resilient cities that support human well-being and avifaunal communities.

Conclusion

This study provides the first comprehensive documentation of 141 avian species in Amravati urban green spaces. The presence of Vulnerable (VU) Asian woolly necked stork and Near Threatened (NT) Alexandrine Parakeets and *European Rollers* underscores the conservation value of these habitats. This study demonstrates that urban green patches in Amravati City serve as vital refuges supporting rich avian diversity and breeding activity amidst ongoing urbanization. The predominance of resident bird species, high diversity indices, and reliance on indigenous trees for nesting underscores the ecological importance of conserving native vegetation within the cityscape. The adaptability of certain species to exotic trees highlights the dynamic nature of urban bird communities. To sustain and enhance avian biodiversity, it is essential to prioritize the preservation of native tree species, develop green corridors, and implement biodiversity-friendly urban planning. These measures will help maintain the ecological balance and promote the coexistence of wildlife with human development in rapidly urbanizing regions like Amravati City.

Table 1: Checklist of Birds in Urban area of Amravati City, Maharashtra

Sr. No.	Common Name	Scientific Name	Family	ST	IUCN status	Food Habits
1	Grey Francolin	*Francolinus pondicerianus*	Phasianidae (7)	R	LC	G
2	Painted Francolin	*Francolinus pictus*		R	LC	G
3	Common Quail	*Coturnix coturnix*		W	LC	G
4	Rain Quail	*Coturnix coromandelica*		R	LC	G
5	Jungle Bush Quail	*Perdicula asiatica*		R	LC	G
6	Barred Buttonquail	*Turnix suscitator*		R	LC	G
7	Indian Peafowl	*Pavo cristatus*		R	LC	I
8	Eurasian wryneck	*Jynx torquilla*	Picidae (4)	W	LC	I
9	Common Flameback	*Dinopium javanense*		R	LC	I
10	Yellow-crowned Woodpecker	*Dendrocopos mahrattensis*		R	LC	I
11	White-naped Woodpecker	*Chrysocolaptes festivus*		R	LC	I
12	Coppersmith Barbet	*Megalaima haemacephala*	Megalaimidae (1)	R	LC	F
13	Indian Grey Hornbill	*Ocyceros birostris*	Bucerotidae(1)	R	LC	O
14	Common Hoopoe	*Upupa epops*	Upupidae (1)	R	LC	G
15	Indian Roller	*Coracias benghalensis*	Coraciidae (2)	R	LC	I
16	European roller	*Coracias grarulus*		W	NT	I
17	Common Kingfisher	*Alcedo atthis*	Alcedinidae (1)	R	LC	P
18	White Throated Kingfisher	*Halcyon smyrnensis*	Halcyonidae(1)	R	LC	P
19	Pied Kingfisher	*Ceryle rudis*	Cerylidae(1)	R	LC	P
20	Green Bee-eater	*Merops orientalis*	Meropidae (1)	R	LC	I
21	Pied Cuckoo	*Clamator jacobinus*	Cuculidae (5)	BM	LC	I
22	Common Hawk Cuckoo	*Hierococcyx varius*		R	LC	I
23	Indian Cuckoo	*Cuculus micropterus*		BM	LC	I
24	Grey-bellied Cuckoo	*Cacomantis passerinus*		BM	LC	I
25	Asian Koel	*Eudynamys scolopaceus*		R	LC	F
26	Southern Coucal	*Centropus sinensis*	Centropodidae (1)	R	LC	I
27	Alexandrine Parakeet	*Psittacula eupatria*	Psittacidae (3)	R	NT	F
28	Rose-ringed Parakeet	*Psittacula krameri*		R	LC	F

29	Plum-headed Parakeet	*Psittacula cyanocephala*		R	LC	F
30	Indian Golden Oriole	*Oriolus kundoo*	Oriolidae (1)			
31	Little Swift	*Apus affinis*	Apodidae (1)	R	LC	I
32	Common Barn Owl	*Tyto alba*	Tytonidae (1)	R	LC	C
33	Eurasian eagle-Owl	*Bubo bubo*	Strigidae (5)	R	LC	C
34	Brown hawk-Owl	*Ninox scutulata*		R	LC	C
35	Collared scops Owl	*Otus lettia*		R	LC	C
36	Indian scops Owl	*Otus bakkamoena*		R	LC	C
37	Spotted Owlet	*Athene brama*		R	LC	C
38	Indian Nightjar	*Caprimulgus asiaticus*	Caprimulgidae (3)	R	LC	I
39	Indian Jungle Nightjar	*Caprimulgus indicus*		R	LC	I
40	Savanna Nightjar	*Caprimulgus affinis*		R	LC	I
41	Rock Pigeon	*Columba livia*	Columbidae (6)	R	LC	G
42	Yellow-footed Green Pigeon	*Treron phoenicoptera*		R	LC	F
43	Eurasian Collard-Dove	*Streptopelia decaocto*		R	LC	G
44	Red Collard-Dove	*Streptopelia tranquebarica*		R	LC	G
45	Spotted Dove	*Spilopelia chinensis*		R	LC	G
46	Laughing Dove	*Spilopelia senegalensis*		R	LC	G
47	Chestnut-bellied Sandgrous	*Pterocles exustus*	Pteroclidae (2)	R		G
48	Painted Sandgrouse	*Pterocles indicus*		R	LC	G
49	Red-wattled Lapwing	*Vanellus indicus*	Charadriidae(2)	R	LC	I
50	Yellow-wattled Lapwing	*Vanellus malabaricus*		R	LC	C
51	Black-shouldered Kite	*Elanus axillaris*	Accipitridae (7)	R	LC	C
52	Black Kite	*Milvus migrans*		R	LC	C
53	Shikra	*Accipiter badius*		R	LC	C
54	Eurasian Marsh Harrier	*Circus aeruginosus*		W	LC	C
55	Short-toed Snake Eagle	*Circaetus gallicus*		R	LC	C
56	Oriental Honey Buzzard	*Pernis ptilorhynchus*		R	LC	C
57	White-eyed Buzzard	*Butastur teesa*		R	LC	C
58	Common Kestrel	*Falco tinnunculus*	Falconidae (1)	R	LC	C
59	Cattle Egret	*Bubulcus ibis*	Ardeidae (5)	R	LC	I
60	Little Egret	*Egretta garzetta*		R	LC	P
61	Great Egret	*Casmerodius albus*		R	LC	P
62	Intermediate Egret	*Mesophoyx intermedia*		R	LC	P
63	Indian Pond Heron	*Ardeola grayii*		R	LC	P
64	Black-crowned Night Heron	*Nycticorax nycticorax*		R	LC	P
65	White-breasted Moorhen	*Amaurornis phoenicurus*	Rallidae(1)	R	LC	O
66	Bay-backed Shrike	*Lanius vittatus*	Laniidae (2)	R	LC	I
67	Long-tailed Shrike	*Lanius schach*		R	LC	I
68	Rufous Treepie	*Dendrocitta vagabunda*	Corvidae (9)	R	LC	I
69	House Crow	*Corvus splendens*		R	LC	O
70	Small Minivet	*Pericrocotus cinnamomeus*		R	LC	I
71	Scarlet Minivet	*Pericrocotus flammeus*		R	LC	I
72	Black Drongo	*Dicrurus macrocercus*		R	LC	I
73	White-browed Fantail	*Rhipidura aureola*		R	LC	I
74	Common Iora	*Aegithina tiphia*		R	LC	I
75	Common Wood shrike	*Tephrodornis pondicerianus*		R	LC	I
76	Asian Paradise-flycatcher	*Terpsiphone paradisi*		R	LC	I
77	Ultra-marine flycatcher	*Ficedula superciliaris*	Muscicapidae (13)	W	LC	I
78	Grey-headed Canary flycatcher	*Culicicapa ceylonensis*		W	LC	I
79	Tickell's Blue flycatchers	*Cyornis tickelliae*		R	LC	I
80	Verditer flycatchers	*Eumyias thalassina*		W	LC	I
81	Red-breasted flycatchers	*Ficedula parva*		W	LC	I
82	Blue throat	*Luscinia svecica*		W	LC	I
83	Oriental Magpie Robin	*Copsychus saularis*		R	LC	I
84	Orange-headed Thrush	*Zoothera citrina*		R	LC	I
85	Indian Robin	*Saxicoloides fulicatus*		R	LC	I
86	Black Redstart	*Phoenicurus ochruros*		W	LC	I
87	Indian Chat	*Cercomela fusca*		R	LC	I
88	Common Stonechat	*Saxicola torquata*		W	LC	I
89	Pied Bush Chat	*Saxicola caprata*		R	LC	I
90	Brahminy Starling	*Sturnia pagodarum*	Sturnidae (4)	R	LC	N
91	Rosy Starling	*pastor roseus*		W	LC	N
92	Asian Pied Starling	*Gracupica contra*		R	LC	O
93	Common Myna	*Acridotheres tristis*		R	LC	O
94	Dusky Crag Martin	*Ptyonoprogne concolor*	Hirundinidae (6)	R	LC	I
95	Grey-throated Martin	*Riparia chinensis*		R	LC	I
96	Barn Swallow	*Hirundo rustica*		W	LC	I
97	Red-rumped Swallow	*Hirundo daurica*		R	LC	I
98	Streak-throated Swallow	*Hirundo fluvicola*		R	LC	I
99	Wire-tailed Swallow	*Hirundo smithii*		R	LC	I
100	Red-vented Bulbul	*Pycnonotus cafer*	Pycnonotidae (1)	R	LC	I
101	Zitting Cisticola	*Cisticola juncidis*	Cisticolidae (1) Sylviidae (14)	R	LC	I
102	Jungle Prinia	*Prinia sylvatica*		R	LC	I
103	Plain Prinia	*Prinia inornata*		R	LC	I

104	Ashy Prinia	*Prinia socialis*		R	LC	I
105	Blyth's Reed Warbler	*Acrocephalus dumetorum*		R	LC	I
106	Booted Warbler	*Hippolais caligata*		W		I
107	Clamorous Reed Warbler	*Acrocephalus stentoreus*		W	LC	I
108	Sulpher-bellied Warbler	*Phylloscopus griseolus*		W	LC	I
109	Orphean Warbler	*Sylvia hortensis*		W	LC	I
110	Lesser Whitethroat	*Sylvia curruca*		W	LC	I
111	Common Tailor Bird	*Orthotomus sutorius*		R	LC	I
112	Yellow-eyed Babbler	*Chrysomma sinense*		R	LC	I
113	Large Grey Babbler	*Turdoides malcolmi*		R	LC	I
114	Jungle Babbler	*Turdoides striatus*		R	LC	I
115	Common Babbler	*Turdoides caudatus*		R	LC	I
116	Oriental White-eye	*Zosterops palpebrosus*	Zosteropidae (1)	R	LC	I
117	Indian Bush Lark	*Mirafra erythroptera*	Alaudidae (6)	R	LC	I
118	Ashy-crowned Sparrow Lark	*Eremopterix griseus*		R	LC	I
119	Sykes's Lark	*Galerida deva*		R	LC	I
120	Singing Bushlark	*Mirafra cantillans*		R	LC	I
121	Greater Short-toed Lark	*Calandrella brachydactyla*		W	LC	I
122	Rufous-tailed Lark	*Ammomanes phoenicura*		R	LC	I
123	Purple-rumped Sunbird	*Leptocoma zeylonica*	Nectarinidae (2)	R	LC	N
124	Purple Sunbird	*Cinnyris asiaticus*		R	LC	N
125	White Wagtail	*Motacilla alba*	Passeridae (14)	W	LC	I
126	White-browed Wagtail	*Motacilla maderaspatensis*		W	LC	I
127	Citrine Wagtail	*Motacilla citreola*		W	LC	N
128	Grey Wagtail	*Motacilla cinerea*		W	LC	I
129	Yellow Wagtail	*Motacilla flava*		W	LC	I
130	Paddy field Pipit	*Anthus rufulus*		R	LC	I
131	Twany Pipit	*Anthus campestris*		W	LC	I
132	House Sparrow	*Passer domesticus*		R	LC	G
133	Chestnut-shouldered Petronia	*Petronia xanthocollis*		R	LC	G
134	Baya Weaver	*Ploceus philippinus*		R	LC	G
135	Red Avadavat	*Amandava amandava*		R	LC	G
136	Indian Silverbill	*Euodice malabarica*		R	LC	G
137	Scaly-breasted Munia	*Lonchura punctulata*		R	LC	G
138	Black-headed Munia	*Lonchura atricapilla*		R	LC	G
139	Indian Pitta	*Pitta brachyura*	Pittidae (1)	BM	LC	I
140	Asian Woolly-necked Stork	*Ciconia episcopus*	Ciconidae(1)	R	VU	I
141	Red-naped Ibis	*Pseudibis papillosa*	Threskiornithidae (1)	R	LC	I

R=Residential; W=Winter Migrant; BM=Breeding Migrant.

IUCN Red list status LC=Least Concern; NT=Near Threatened, Frugivorous=F; Insectivorous=I; Nectivorous=N; Granivorous=G; Omnivorous=O; Carnivorous=C; Piscivorous=P

Table 2: Summary of diversity indices of birds in study area

Index	Value
Taxa (S)	141
Individuals	1182
Dominance (D)	0.01576
Simpson (1-D)	0.9842
Shannon (H)	4.456
Evenness (e^H/S)	0.6287

Table 3: Checklist of plants of Urban Landscape of Amravati City associated with the bird diversity

Sr. No.	Common Name	Scientific Name
1	Ashoka	*Polyalthia longifolia*
2	Neem	*Azadirachta indica*
3	Babul	*Acacia nilotica*
4	Nilgiri	*Eucalyptus globulus*
5	Pimpal	*Ficus religiosa*
6	Guava	*Psidium guajava*
7	Sitaphal	*Annona squamosa*
8	Mango	*Mangifera indica*
9	Bamboo	*Dendrocalamus strictus*
10	Amla	*Phyllanthus emblica*
11	Sissoo	*Dalbergia sissoo*
12	Ber	*Ziziphus mauritiana*
13	Ramphal	*Annona reticulata*
14	Wild Badam	*Terminalia catappa*
15	Bel	*Aegle marmelos*
16	Tamarind	*Tamarindus indica*
17	Manila Tamarind	*Pithecellobium dulce*
18	Mulberry	*Morus alba or Morus indica*
19	Gulmohar	*Delonix regia*
20	Chapha	*Plumeria alba*
21	Khair	*Acacia catechu*
22	Shirish	*Albizia lebbeck*

23	Apta	*Bauhinia tomentosa*
24	Maharukh	*Ailanthus excelsa*
25	Katesawar	*Bombax ceiba*
26	Umbar	*Ficus racemosa*
27	Royal Palm	*Roystonea regia*
28	Putranjiva	*Putranjiva roxburghii*
29	Jamun	*Syzygium cumini*
30	Teak	*Tectona grandis*
31	Amaltas	*Cassia fistula*
32	Sausage Tree	*Kigelia africana*
33	Coconut	*Cocos nucifera*
34	Banyan Tree	*Ficus benghalensis*
35	Pakhad	*Ficus virens*
36	Khirni	*Manilkara hexandra*
37	Palas	*Butea monosperma*
38	Pangara	*Erythrina variegata*
39	Karanj	*Pongamia pinnata*
40	Akashkandil	*Thespesia populnea*
41	Singapoor Berry	*Muntingia calabura*
42	Arjun	*Terminalia arjuna*
43	Mahua	*Madhuca longifolia*
44	Shisham	*Dalbergia sissoo*
45	Kadamb	*Neolamarckia cadamba*
46	Kakda	*Tagetes erecta*
47	Lemon	*Citrus limon*
48	Indian Coral	*Erythrina indica*
49	Subabul	*Leucaena leucocephala*
50	Kavat (Wood Apple)	*Limonia acidissima*
51	Chikoo	*Manikara Zapota*
52	Jarul	*Lagerstroemia speciosa*
53	Saptaparni	*Alstonia scholaris*
54	Kassod	*Cassia siamea*

Table 4: Nesting bird species recorded in the Urban Landscape of Amravati City

Sr. No.	Common Name	Scientific Name	Nesting Site
1	Coppersmith Barbet	*Psilopogon haemacephalus*	Tree cavity
2	Common Flameback	*Dinopium javanense*	Tree trunk cavity
3	Indian Grey Hornbill	*Ocyceros birostris*	Natural tree cavity
4	Alexandrine Parakeet	*Psittacula eupatria*	Tree cavity / wall hole
5	Rose-ringed Parakeet	*Psittacula krameri*	Tree cavity / wall cavity
6	Spotted Owlet	*Athene brama*	Tree hole / wall crevice
7	Common Myna	*Acridotheres tristis*	Wall hole / building crevice
8	Brahminy Starling	*Sturnia pagodarum*	Tree hole / second branch
9	Oriental Magpie Robin	*Copsychus saularis*	Tree fork / building crevice
10	Indian Robin	*Saxicoloides fulicatus*	Ground / wall cleft
11	House Crow	*Corvus splendens*	Tree branch
12	Cattle Egret	*Bubulcus ibis*	Colony gardern on trees near water
13	Indian Pond Heron	*Ardeola grayii*	Tree near water
14	Purple Sunbird	*Cinnyris asiaticus*	Hanging nest on small branches
15	Indian Chat	*Oenanthe fusca*	Wall crevices / rock ledges
16	Rock Pigeon	*Columba livia*	Building ledge / wall cavity
17	Ashy Prinia	*Prinia socialis*	Low shrubs / grass clumps
18	Laughing Dove	*Spilopelia senegalensis*	Tree fork / wall ledge
19	Eurasian Collared Dove	*Streptopelia decaocto*	Trees / electrical poles
20	Indian Silverbill	*Euodice malabarica*	Thorny bush / shrubs
21	Scaly-breasted Munia	*Lonchura punctulata*	Grasses / bush nests
22	Red-vented Bulbul	*Pycnonotus cafer*	Shrubs / tree forks
23	Tailorbird	*Orthotomus sutorius*	Sewn leaves in shrubs
24	White-breasted Waterhen	*Amaurornis phoenicurus*	Grass near water
25	Red-wattled Lapwing	*Vanellus indicus*	Ground (open)
26	Paradise Flycatcher	*Terpsiphone paradisi*	Tree forks / horizontal branches
27	Black Kite	*Milvus migrans*	Tall trees
28	Black-shouldered Kite	*Elanus axillaris*	Trees / isolated tall perches
29	Shikra	*Accipiter badius*	Tree branch
30	Baya Weaver	*Ploceus philippinus*	Suspended nests on trees
31	House Sparrow	*Passer domesticus*	Wall hole / roof gaps
32	Dusky Crag Martin	*Ptyonoprogne concolor*	Wall ledge / under eaves
33	Little Swift	*Apus affinis*	Building crevices / under roofs
34	Jungle Babbler	*Turdoides striata*	Shrubs / tree branches
35	Oriental White-eye	*Zosterops palpebrosus*	Small tree branches / bushes
36	Barn Owl	*Tyto alba*	Wall cavities / abandoned buildings
37	Little Cormorant	*Microcarbo niger*	Trees near wetlands in colonies
38	Purple-rumped Sunbird	*Leptocoma zeylonica*	Hanging nest on outer tree branches
39	Asian Woolly-necked Stork	*Ciconia episcopus*	Tall trees near wetlands
40	Black Drongo	*Dicrurus macrocercus*	Tree branch / electric pole
41	Red-naped Ibis	*Pseudibis papillosa*	Tall trees / wetlands

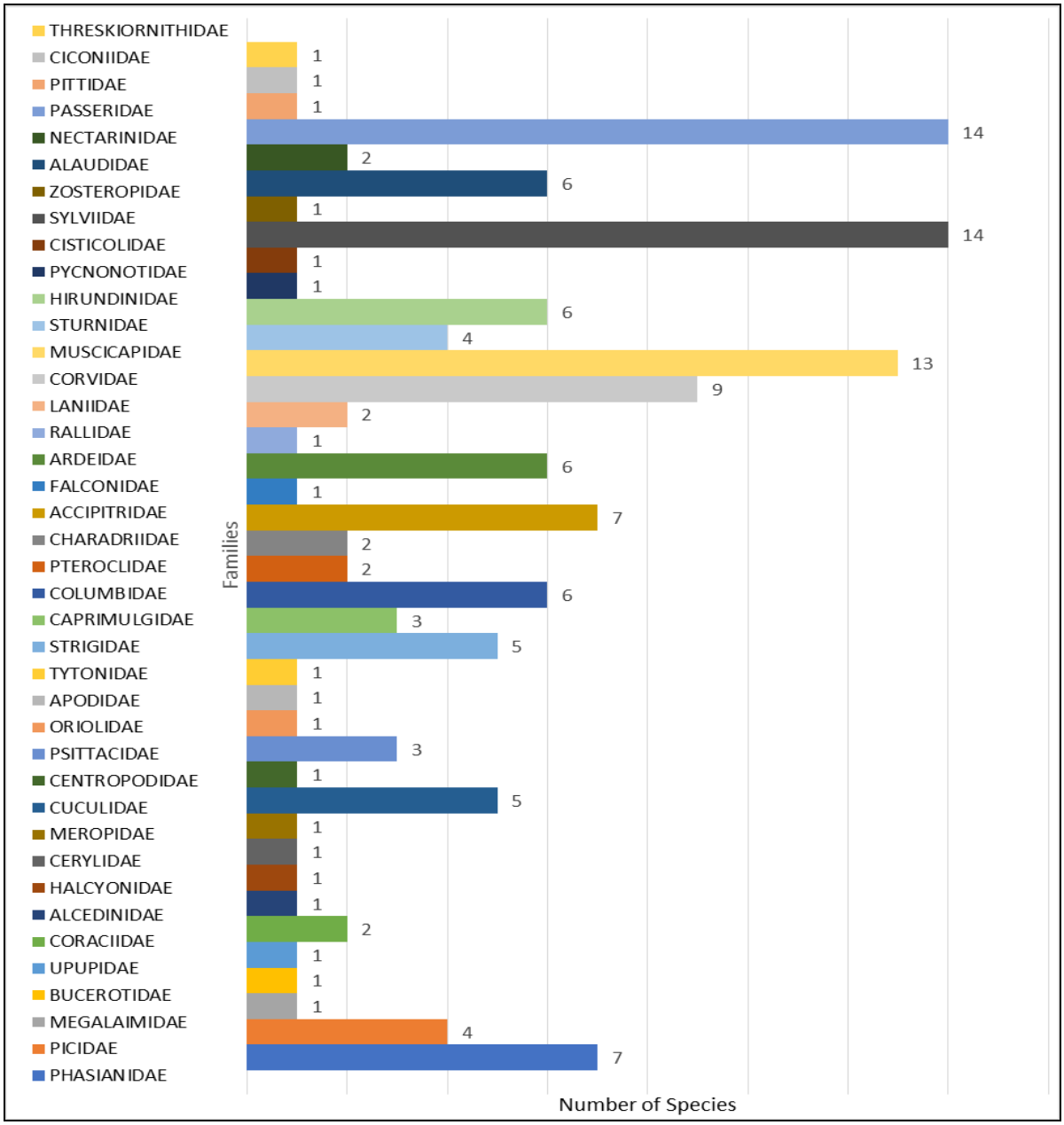


Fig 1: Graph showing family-wise numbers of bird species in Green Spaces in Urban area, Amravati city

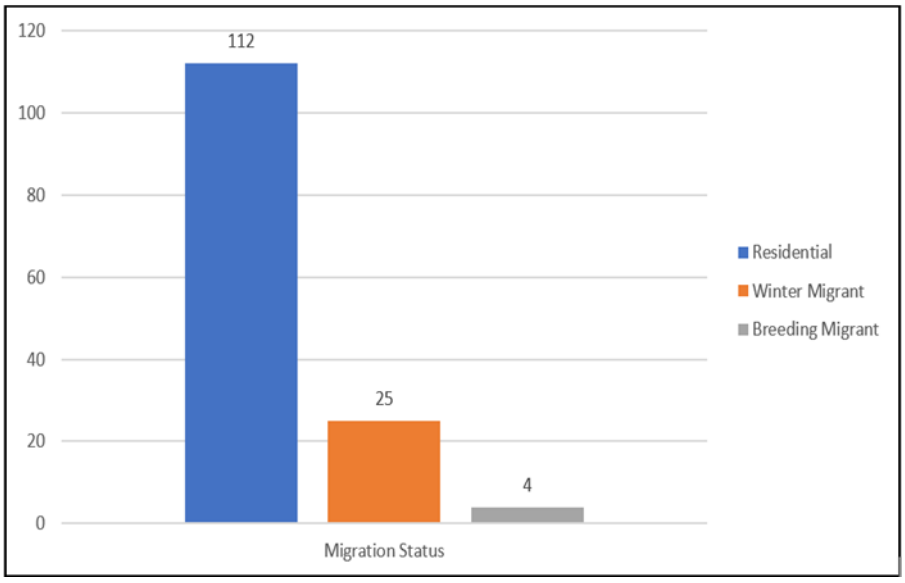


Fig 2: Diagram showing percentage of Resident (R) and Winter Migrant (W) and Breeding Migrant (BM) birds in study area

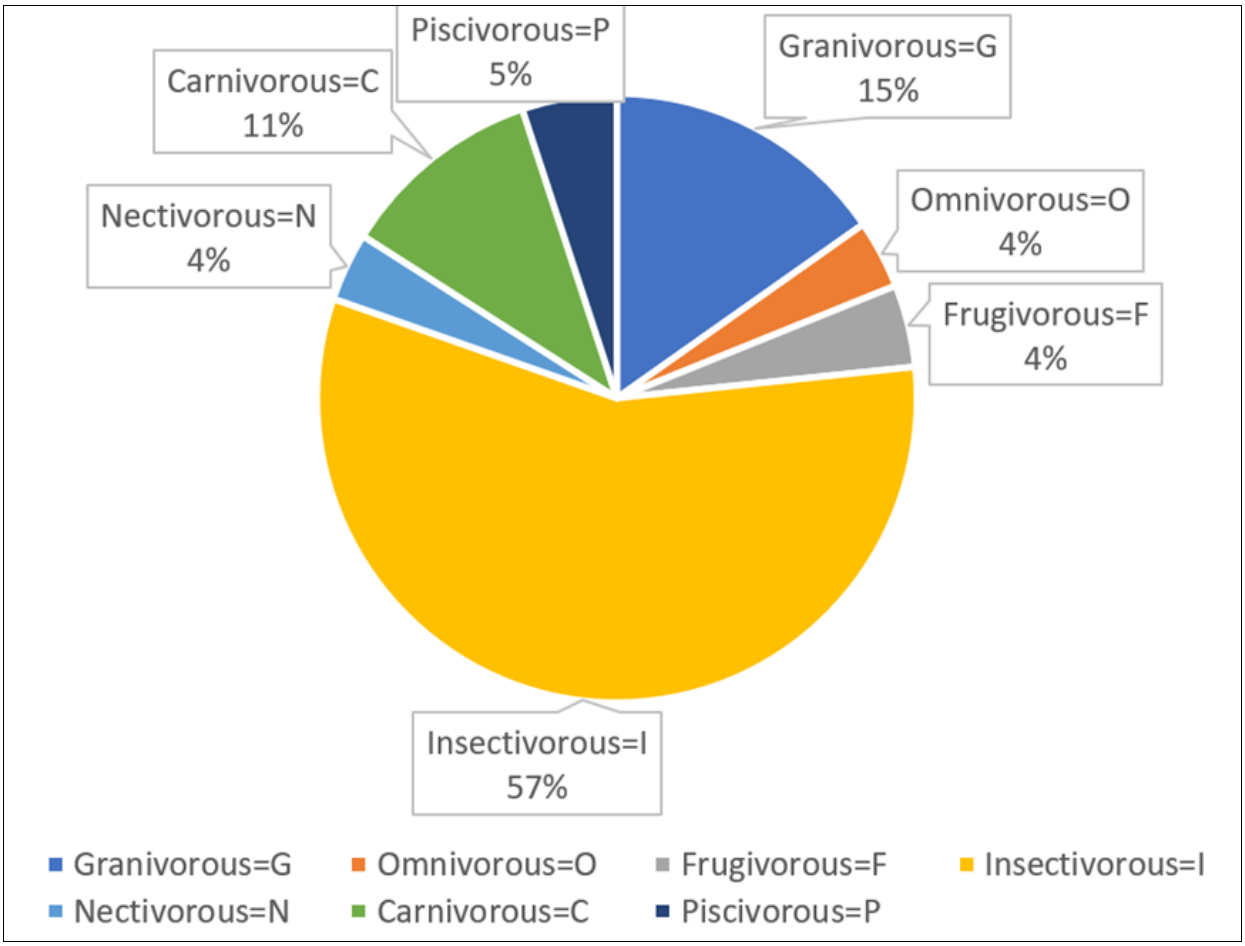


Fig 3: Distribution of different dietary habits among birds in study area

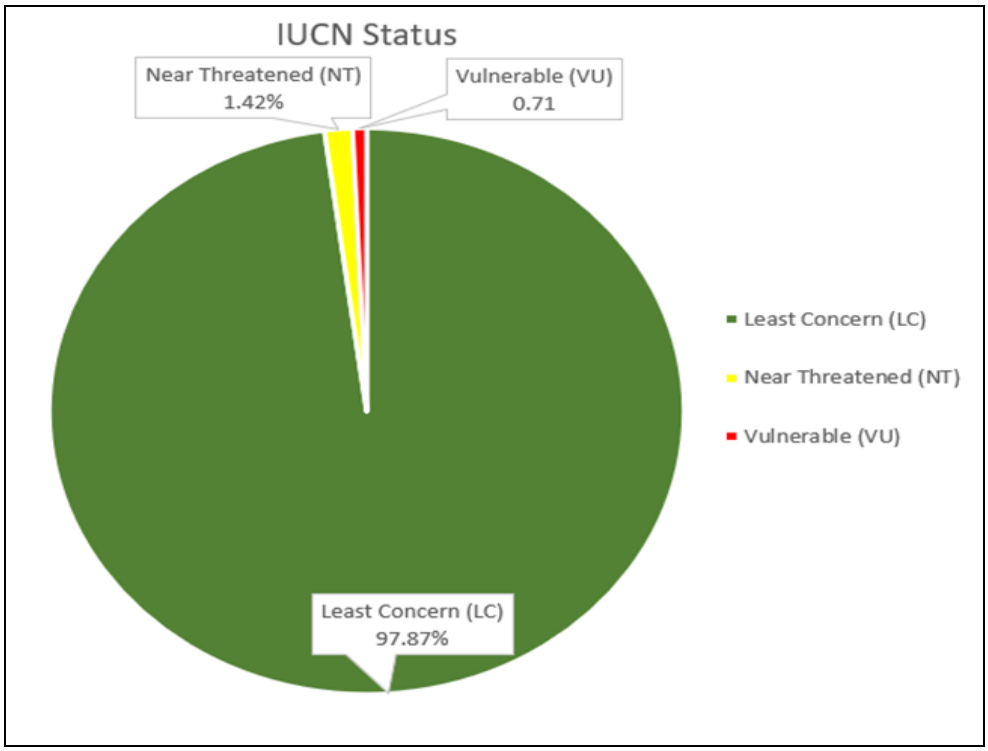
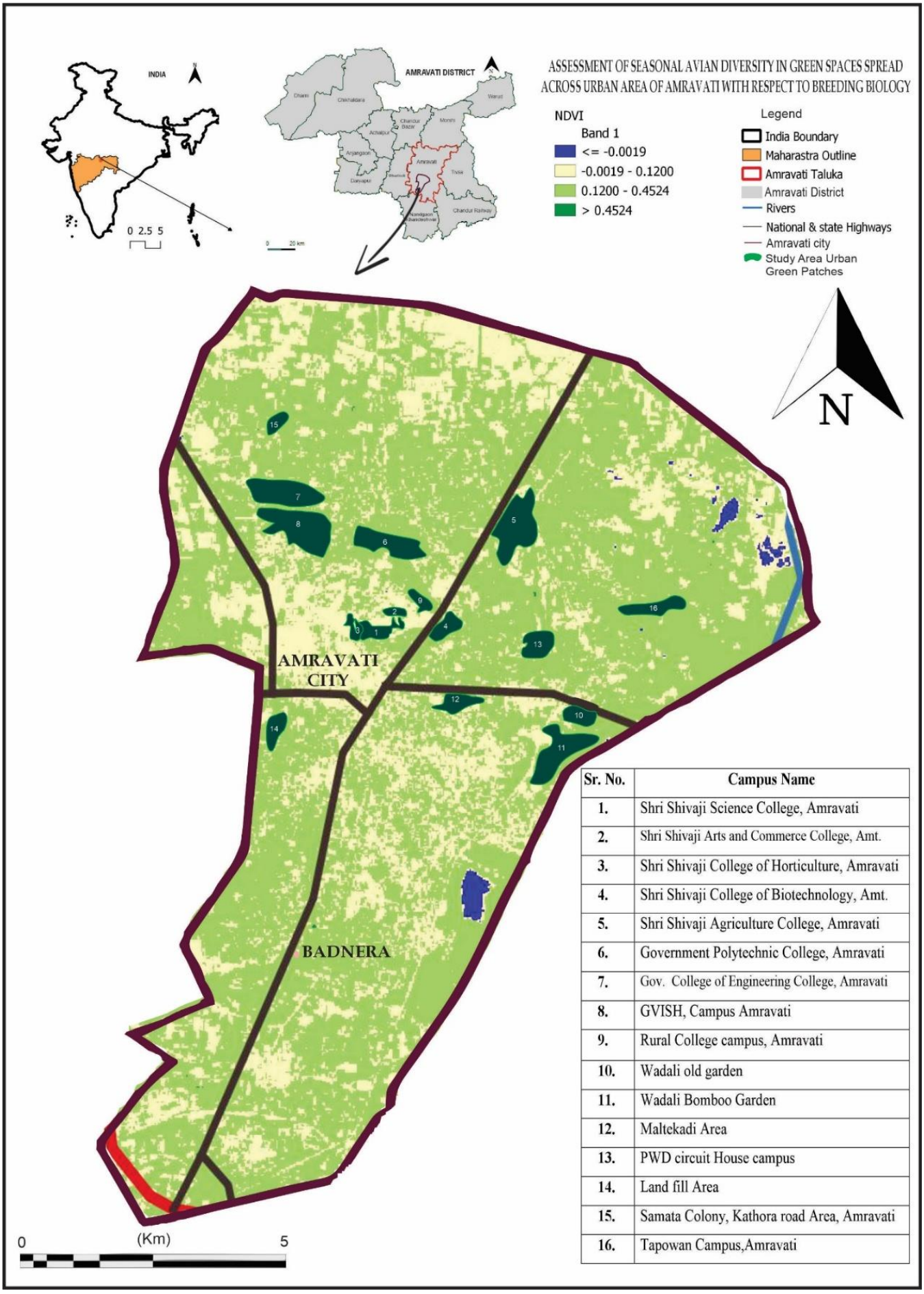


Fig 4: IUCN Red List conservation status of bird recorded in green spaces of Amravati City



Sr. No.	Campus Name
1.	Shri Shivaji Science College, Amravati
2.	Shri Shivaji Arts and Commerce College, Amt.
3.	Shri Shivaji College of Horticulture, Amravati
4.	Shri Shivaji College of Biotechnology, Amt.
5.	Shri Shivaji Agriculture College, Amravati
6.	Government Polytechnic College, Amravati
7.	Gov. College of Engineering College, Amravati
8.	GVISH, Campus Amravati
9.	Rural College campus, Amravati
10.	Wadali old garden
11.	Wadali Bomboo Garden
12.	Maltekadi Area
13.	PWD circuit House campus
14.	Land fill Area
15.	Samata Colony, Kathora road Area, Amravati
16.	Tapowan Campus,Amravati

Map 1: Map showing different study sites (Green spaces) in Amravati City, Maharashtra, India

European Roller (*Coracias garrulus*)

Alexandrine Parakeet (*Psittacula eupatria*)

Indian Pitta (*Pitta brachyura*)

Red Avadavat (*Amandava amandava*)

Barn Owl (*Tyto alba*)

Indian Grey Hornbill (*Ocyceros birostris*)

Common Myna (*Acridotheres tristis*)

Shikra (*Accipiter badius*)

Plate 1: Important bird sightings in the study area.

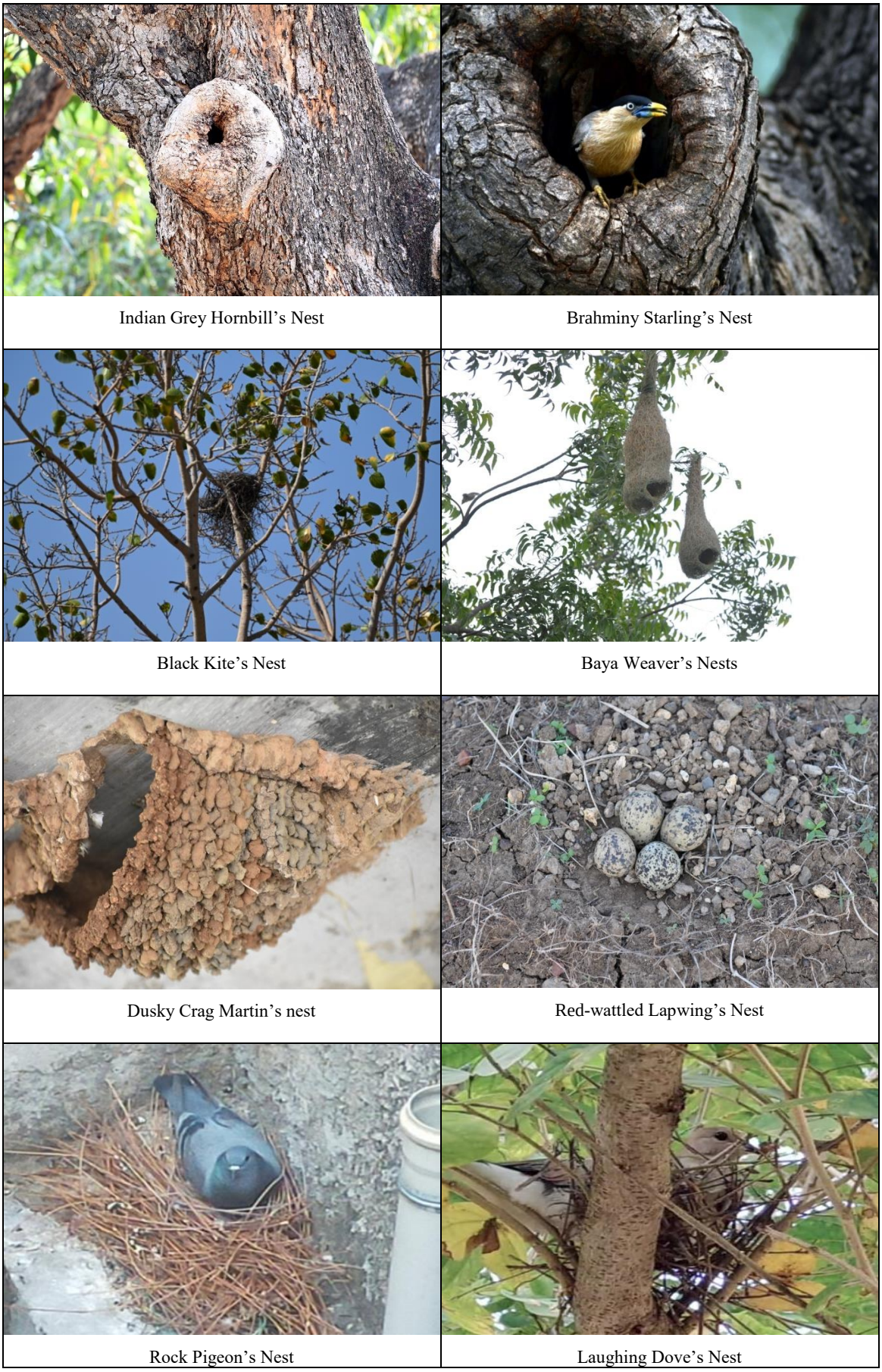


Plate 2: Images of nest in green spaces spread across urban area in Amravati City.

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Conflict of Interest

The author declares that there is no Conflict of Interest.

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