

Diversity, conservation status, and nesting ecology of avifauna of Barpeta Town, Assam, India

Surdeep Das^{1*}, Manmi Kalita², Pradip Kumar Sarma³

¹ Department of Zoology, Bhattadev University, Bajali, Pathsala, Assam, India

² Research Scholar, Department of Zoology, Bhattadev University, Bajali, Pathsala, Assam, India

³ Associate Professor, Department of Zoology, Bhattadev University, Bajali, Pathsala, Assam, India

Corresponding Author: Surdeep Das

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Abstract

Avifaunal diversity and nesting ecology were investigated in Barpeta Town, Assam, to evaluate species composition and conservation status in an urban landscape. Systematic field surveys were conducted across wetlands, agricultural areas, and urban green spaces from February to April 2024. A total of 56 bird species representing 31 families were recorded. Family-wise analysis showed dominance of Columbidae (5 species) and Sturnidae (5 species). Feeding guild assessment revealed predominance of insectivorous (34%) and omnivorous (34%) species. According to the IUCN Red List, 53 species were categorized as Least Concern and three as Near Threatened (Lesser Adjutant, Oriental Darter, Black-headed Ibis). Nesting site analysis indicated pronounced vertical stratification, with nesting heights ranging from ground-level nests (Red-wattled Lapwing) to high canopy structures (Black Kite, averaging 85 ft). The findings demonstrate that heterogeneous urban habitats support substantial avian diversity. Protection of wetlands and vegetated areas is critical for sustaining nesting and foraging habitats. The study provides baseline data for long-term avifaunal monitoring and urban biodiversity conservation in rapidly urbanizing landscapes of northeastern India.

Keywords: Avifauna, urban biodiversity, nesting ecology, conservation status, IUCN Red List, Barpeta Town, Assam

Introduction

Birds are among the most conspicuous and ecologically significant components of terrestrial and aquatic ecosystems. They play a crucial role in maintaining ecological balance by participating in seed dispersal, pollination, pest control, scavenging, and nutrient cycling (Sekercioglu, 2006) ^[10]. Due to their sensitivity to environmental changes, birds are widely regarded as reliable indicators of habitat quality and ecosystem health (Gregory *et al.*, 2003) ^[5].

India supports one of the richest avifaunal assemblages in the world owing to its diverse climatic and geographical conditions (Ali and Ripley, 1987) ^[1]. The northeastern region of India, particularly Assam, is recognized as a biodiversity hotspot because of its wetlands, river systems, forest patches, agricultural fields, and rapidly expanding urban landscapes (Choudhury, 2000) ^[2].

Barpeta Town, Assam, represents a mosaic of urban settlements, water bodies, and vegetation patches that provide suitable habitats for a wide range of bird species. However, increasing urbanization and habitat modification may influence species composition and nesting behaviors. The present study aims to document the avian diversity, conservation status, and nesting ecology of Barpeta Town, Assam, India, to generate baseline data for future conservation planning and urban biodiversity management.

Materials and Methods

Study Area

The study was carried out in Barpeta Town, Assam, India. Barpeta Town is a significant urban center located in the Barpeta district of Assam, situated in the western part of Assam, approximately 90 kilometers northwest of Guwahati city. The town is geographically positioned at coordinates 26.3304°N latitude and 91.0041°E longitude, with a total area of approximately 7.77 km². The town experiences a

subtropical monsoon climate, characterized by hot summers, a significant monsoon season, and mild winters.

Data Collection

Fieldwork was carried out from February 2024 to April 2024 in Barpeta Town. Observations were conducted during peak bird activity periods: between 05:00 and 10:00 hours in the morning and between 15:00 and 17:00 hours in the evening. Avian species were documented and identified using field observation techniques, aided by digital photography and online identification tools (Google Lens), cross-referenced with standard field guides including Grimmett *et al.* (2011) ^[6] and consultation with avian experts.

Birds were observed with patience at various habitat types including wetlands, urban green spaces, agricultural fields, and residential areas. Nests and nesting sites of respective species were carefully documented. Nesting heights were measured as approximations using visual estimation and comparison with known reference heights. Birds and nests were photographed using a Nikon COOLPIX L340 digital camera for documentation and verification purposes.

Results

Species Richness and Family Composition

A total of 56 bird species belonging to 31 families were recorded from Barpeta Town during the study period from February to April 2024 (Table 1). Species richness varied across months, with the highest number of species recorded in March (36 species), followed by April (29 species) and February (20 species). Families Columbidae and Sturnidae were the most dominant, each represented by five species, indicating their adaptability to urban environments. Other families, such as Alcedinidae, Anatidae, Ardeidae, and Megalaimidae, also show notable diversity with two or more species (Table 1; Fig.1).

Table 1: Detailed information of the avian diversity in Barpeta Town, Assam (February-April 2024)

Sl. no	Family	Scientific Name	Common Name	IUCN Status	Feeding Habit
1	Accipitridae	<i>Milvus migrans</i>	Black Kite	Least Concern	Carnivorous
2	Aegithinidae	<i>Aegithina tiphia</i>	Common iora	Least Concern	Insectivorous
3	Alcedinidae	<i>Halcyon smyrnensis</i>	White- throated Kingfisher	Least Concern	Carnivorous
4		<i>Ceryle rudis</i>	Pied Kingfisher	Least Concern	Piscivorous
5	Anatidae	<i>Dendrocygna javanica</i>	Lesser whistling duck	Least Concern	Omnivorous
6		<i>Anas platyrhynchos domesticus</i>	Domestic Goose	Least concern	Omnivorous
7	Ardeidae	<i>Bubulcus ibis</i>	Cattle Egret	Least Concern	Insectivorous
8		<i>Egretta garzetta</i>	Little Egret	Least Concern	Piscivorous
9		<i>Ardeola grayii</i>	Indian Pond Heron	Least Concern	Omnivorous
10	Bucerotidae	<i>Upupa epops</i>	Eurasian Hoopoe	Least Concern	Insectivorous
11	Campephagidae	<i>Coracina macei</i>	Large Cuckooshrike	Least Concern	Insectivorous
12	Charadriidae	<i>Vanellus indicus</i>	Red-wattled Lapwing	Least Concern	Insectivorous
13		<i>Charadrius dubius</i>	Little Ringed Plover	Least Concern	Insectivorous
14	Ciconiidae	<i>Leptoptilos javanicus</i>	Lesser adjutant	Near Threatened	Carnivorous
15		<i>Anastomus oscitans</i>	Asian openbill	Least Concern	Carnivorous
16	Cisticolidae	<i>Orthotomus sutorius</i>	Common tailorbird	Least Concern	Insectivorous
17	Columbidae	<i>Columba livia domesticus</i>	Feral Pigeon	Least Concern	Granivorous
18		<i>Streptopelia chinensis</i>	Spotted Dove	Least Concern	Granivorous
19		<i>Treron phoenicopterus</i>	Yellow- footed Green Pigeon	Least Concern	Frugivorous
20		<i>Streptopelia tranquebarica</i>	Red Collared Dove	Least Concern	Granivorous
21		<i>Columba livia</i>	Rock pigeon	Least Concern	Omnivorous
22	Corvidae	<i>Corvus macrorhynchos</i>	Large-billed Crow	Least Concern	Omnivorous
23		<i>Corvus splendens</i>	House crow	Least Concern	Omnivorous
24	Cuculidae	<i>Eudynamis scolopaceus</i>	Asian Koel	Least Concern	Omnivorous
25		<i>Hierococyx varius</i>	Common Hawk-Cuckoo	Least Concern	Insectivorous
26	Dicruridae	<i>Dicrurus macrocercus</i>	Black drongo	Least Concern	Insectivorous
27	Estrildidae	<i>Lonchura punctulata</i>	Scaly- breasted Munia	Least Concern	Granivorous
28	Jacanidae	<i>Metopidius indicus</i>	Bronze- winged Jacana	Least Concern	Insectivorous
29	Laniidae	<i>Lanius cristatus</i>	Brown shrike	Least Concern	Carnivorous
30		<i>Lanius schach</i>	Long-tailed Shrike	Least Concern	Carnivorous
31		<i>Megalaima asiatica</i>	Blue-throated barbet	Least Concern	Omnivorous
32	Megalaimidae	<i>Megalaima lineata</i>	Lineated barbet	Least Concern	Omnivorous
33		<i>Megalaima haemacephala</i>	Coppersmith barbet	Least Concern	Omnivorous
34	Meropidae	<i>Merops orientalis</i>	Asian green bee eater	Least Concern	Insectivorous
35	Motacillidae	<i>Anthus rufulus</i>	Paddyfield Pipit	Least Concern	Insectivorous
36		<i>Motacilla alba</i>	White Wagtail	Least Concern	Insectivorous
37		<i>Motacilla maderaspatensis is</i>	White-browed Wagtail	Least Concern	Insectivorous
38		<i>Motacilla citreola</i>	Citrine Wagtail	Least Concern	Insectivorous
39	Muscicapidae	<i>Copsychus saularis</i>	Oriental Magpie- Robin	Least Concern	Insectivorous
40		<i>Rhipidura albicollis</i>	White- throated Fantail	Least Concern	Insectivorous
41	Nectariniidae	<i>Aethopyga siparaja</i>	Crimson Sunbird	Least Concern	Nectarivorous
42	Oriolidae	<i>Oriolus xanthornus</i>	Black-hooded Oriole	Least Concern	Frugivorous
43	Passeridae	<i>Passer domesticus</i>	House sparrow	Least Concern	Omnivorous
44	Phalacrocoracidae	<i>Microcarbo niger</i>	Little Cormorant	Least Concern	Piscivorous
45		<i>Anhinga melanogaster</i>	Oriental Darter	Near Threatened	Piscivorous
46	Picidae	<i>Dendrocopos macei</i>	Fulvous- breasted Woodpecker	Least Concern	Insectivorous
47		<i>Dinopium benghalense</i>	Black-rumped Flameback	Least Concern	Insectivorous
48	Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Least Concern	Omnivorous
49	Rallidae	<i>Amauormis phoenicurus</i>	White- breasted Waterhen	Least Concern	Omnivorous
50	Strigidae	<i>Athene brama</i>	Spotted owl	Least Concern	Carnivorous
51	Sturnidae	<i>Sturnia malabarica</i>	Chestnut- tailed Starling	Least Concern	Omnivorous
52		<i>Acridotheres tristis</i>	Common Myna	Least Concern	Omnivorous
53		<i>Gracupica contra</i>	Indian Pied Myna	Least Concern	Omnivorous
54		<i>Turdoides striata</i>	Jungle Babbler	Least Concern	Omnivorous
55		<i>Acridotheres fuscus</i>	Jungle Myna	Least Concern	Omnivorous
56	Threskiornithidae	<i>Threskiornis melanocephalus</i>	Black-headed ibis	Near Threatened	Omnivorous

Feeding Guild Analysis

Feeding guild analysis showed that insectivorous and omnivorous birds dominated the assemblage, each representing 34% of the total species (19 species each) (fig.2). Carnivorous birds accounted for 12% (7 species), while piscivorous and granivorous birds each comprised 7% (4 species each). Frugivorous birds represented 4% (2 species), and nectarivorous birds were the least common at

2% (1 species). This distribution highlights the diversity in feeding habits among bird species, reflecting habitat heterogeneity and availability of diverse food resources in the urban landscape.

Conservation Status

Assessment of conservation status revealed that the majority of species (53 species, 94.6%) were categorized as Least

Concern according to the IUCN Red List (2023) [7]. This classification suggests that the populations of these species are reasonably stable with minimal immediate extinction risk.

However, three species (5.4%) were classified as Near Threatened: Lesser Adjutant (*Leptoptilos javanicus*), Oriental Darter (*Anhinga melanogaster*), and Black-headed Ibis (*Threskiornis melanocephalus*). This categorization indicates that although these species are not currently

vulnerable or endangered, they face potential threats and may require monitoring and preventative conservation actions to prevent further population decline.

Nesting Ecology

Nesting observations revealed considerable variation in nesting sites and heights among recorded species (Table 2). Vertical stratification in nesting preferences was evident, ranging from ground-level nests to high canopy structures.

Table 2: Nesting heights of some of recorded birds of Barpeta town

S.No.	Bird Species	Nesting Height Range (ft)	Average Height (ft)
1	Indian Pied Myna	12-15	13.5
2	Spotted Dove	6-12	9.0
3	Jungle Myna	12-15	13.5
4	Lineated Barbet	10-14	12.0
5	Blue-throated Barbet	9-13	11.0
6	Black Kite	80-90	85.0
7	Red-wattled Lapwing	0	0
8	White-breasted Waterhen	5-10	7.5
9	Black-rumped Flameback	10-15	12.5
10	White-throated Fantail	8-10	9.0

Black Kite (*Milvus migrans*) nested at the highest elevation (average 85 ft, range 80-90 ft), where they are protected from ground predation and human disturbances. In contrast, Red-wattled Lapwing (*Vanellus indicus*) nested on the ground (0 ft), relying on natural camouflage and aggressive defensive behaviors to protect nests from predators. Mid-level nesters that demonstrated adaptability to urban settings included Jungle Myna and Indian Pied Myna (12-15 ft). Lower-altitude nesters like the White-breasted Waterhen favored dense undergrowth near water bodies (5-10 ft) (table.2). This vertical stratification indicates that the town's avian biodiversity depends on the preservation of diverse habitats across multiple vertical strata, including both canopy structures and ground-level vegetation.

Detailed Nesting Site Observations

Upon survey, the nesting sites of the following avian species were documented from February to April 2024:

- **Indian Pied Myna (*Gracupica contra*):** These are among the most common avian species in Barpeta. They adapt well to human-altered environments. They construct nests using twigs and grass. They are often found nesting in colonies, with multiple nests in close proximity.
- **Spotted Dove (*Streptopelia chinensis*):** They build nests in both natural and man-made sites such as attics. Their nests are loosely constructed platforms.
- **Jungle Babbler (*Turdoides striata*):** They are mostly seen nesting in natural sites. They primarily utilize natural cavities or holes made by other animals.
- **Lineated Barbet (*Psilopogon lineatus*):** These birds use their strong beaks to excavate cavities in tree trunks. They also utilize holes made by other birds such as woodpeckers.
- **Blue-throated Barbet (*Psilopogon asiaticus*):** Like other barbet species, they are cavity nesters. They excavate holes in trees themselves or utilize cavities made by other birds or natural processes.

- **Black Kite (*Milvus migrans*):** They build nests on tall structures, either natural or man-made. They were frequently observed nesting on communication towers.
- **Red-wattled Lapwing (*Vanellus indicus*):** Their nest consists of a simple shallow depression on the ground. They use natural camouflage to protect nests from predators. They are also aggressive and produce loud alarm calls when threatened.
- **White-breasted Waterhen (*Amaurornis phoenicurus*):** They build nests in densely vegetated areas. They primarily nest near water bodies in thick undergrowth.
- **Black-rumped Flameback (*Dinopium benghalense*):** These birds possess strong beaks that they use to excavate tree trunks to create nesting cavities. They also utilize holes made by other birds.
- **White-throated Fantail (*Rhipidura albicollis*):** They build cup-shaped nests using dried grasses and decomposed wood, which they weave together.

Discussion

Species Diversity and Urban Adaptation

The documentation of 56 bird species from 31 families in Barpeta Town indicates that despite urbanization challenges, areas of natural habitat remain that can sustain significant biodiversity. Preserving these habitats is essential for maintaining avian diversity in urban landscapes. The presence of multiple bird families, ranging from Accipitridae to Threskiornithidae, suggests that diverse habitats are available to support distinct ecological niches. The dominance of generalist species such as pigeons (Columbidae) and mynas (Sturnidae) suggests that urban-tolerant birds thrive in modified environments (Marzluff, 2001) [8]. These species have successfully adapted to anthropogenic landscapes, utilizing human structures for nesting and foraging. However, the presence of specialist species, particularly those requiring specific habitat conditions, highlights the importance of preserving habitat heterogeneity within urban matrices.

Feeding Guilds and Ecological Functions

The predominance of insectivorous birds (34%) demonstrates that robust insect populations are essential for maintaining ecological balance in urban environments. Insectivorous species such as Common Iora (*Aegithina tiphia*) and Black Drongo (*Dicrurus macrocercus*) play crucial roles in natural pest control, which has implications for both ecosystem health and agricultural productivity in peri-urban areas.

The significant representation of omnivorous species (34%) reflects the opportunistic feeding strategies that enable birds to exploit diverse food resources in heterogeneous urban landscapes. The aquatic biodiversity of the town is further highlighted by piscivorous species like Little Cormorant (*Microcarbo niger*) and Pied Kingfisher (*Ceryle rudis*), which indicate the presence of fish-rich water bodies that require protection from pollution and habitat degradation.

Nesting Ecology and Vertical Stratification

Vertical stratification in nesting preferences helps reduce interspecific competition and minimizes predation risks. Martin *et al.* (1988) ^[9] highlighted that higher nesting sites, such as those preferred by the Black Kite (80-90 ft), provide better protection from ground predators and human disturbances. This finding is consistent with observations in Barpeta Town, where Black Kites utilize tall man-made structures for nesting.

The presence of ground-nesting species, such as the Red-wattled Lapwing, highlights the need for ground-level habitat conservation. Götmark *et al.* (1995) ^[4] demonstrated that ground-nesting birds are more susceptible to habitat loss and require targeted conservation efforts to mitigate the

impacts of human activities, including free-ranging domestic animals and habitat trampling.

Mid-level nesters such as Jungle Myna and Indian Pied Myna (12-15 ft) demonstrate adaptability to urban settings by utilizing both natural and anthropogenic structures. Lower-altitude nesters like the White-breasted Waterhen favor dense undergrowth near water bodies (5-10 ft), emphasizing the importance of preserving riparian vegetation and wetland margins.

Conservation Implications

Although the majority of species were categorized as Least Concern, the presence of three Near Threatened species (Lesser Adjutant, Oriental Darter, Black-headed Ibis) highlights potential impacts of habitat degradation, wetland loss, and anthropogenic disturbances. Similar findings have been reported from other urban and semi-urban areas of Assam (Deka *et al.*, 2019) ^[3]. These Near Threatened species serve as indicator species requiring targeted monitoring and conservation interventions.

Wetland conservation is particularly critical for supporting waterbirds, including piscivorous and wading species. Protection of existing wetlands, restoration of degraded water bodies, and regulation of pollution are essential for maintaining populations of aquatic and semi-aquatic bird species.

Preservation of nesting habitats across vertical strata is essential for sustaining avian diversity. Urban planning should incorporate considerations for maintaining tree cover of varying heights, protecting ground-level vegetation, and ensuring availability of nesting substrates for diverse guilds of birds.

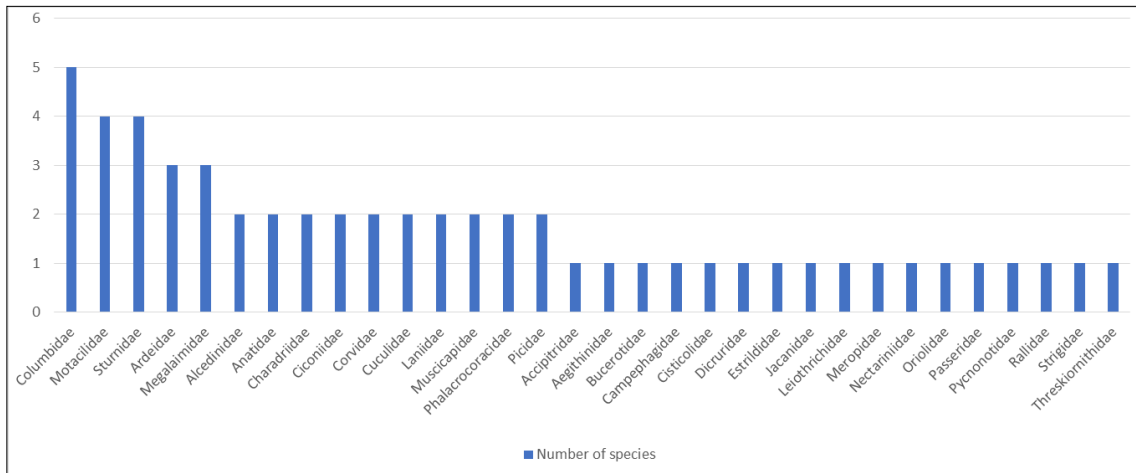


Fig 1: Graph showing the number of species under different families

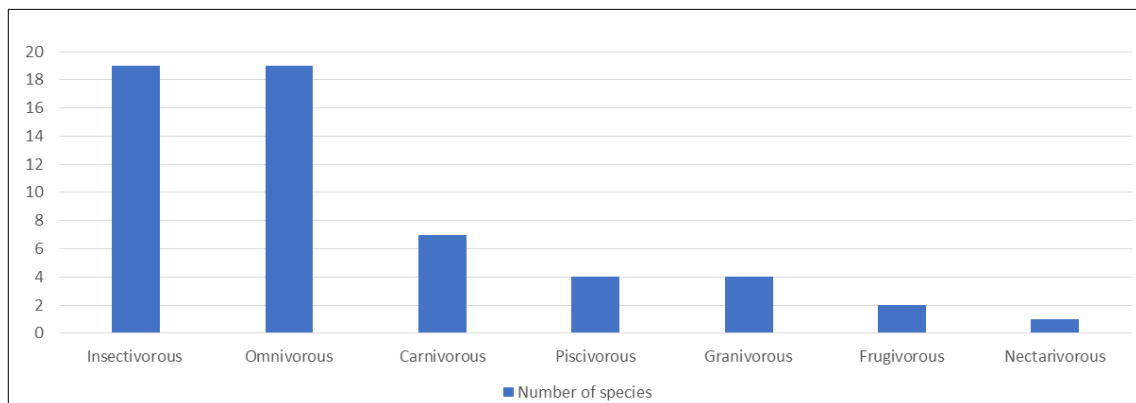


Fig 2: Graph showing the number of species under different feeding habits

Conclusion

The present study highlights Barpeta Town as an important habitat supporting diverse avifaunal communities despite increasing urbanization. The documentation of 56 species from 31 families, including three Near Threatened species, provides valuable baseline data for biodiversity monitoring and conservation planning.

Key findings include the dominance of insectivorous and omnivorous feeding guilds, pronounced vertical stratification in nesting preferences, and the adaptability of certain species to urban environments. The presence of Near Threatened species underscores the conservation value of urban habitats when appropriate habitat features are maintained.

Conservation of wetlands, vegetation cover at multiple vertical strata, and nesting sites is strongly recommended to ensure long-term survival of avian species in the region. Future research should focus on long-term monitoring of population trends, assessment of breeding success, and evaluation of specific threats to Near Threatened species. Integration of avian conservation considerations into urban planning processes is essential for maintaining biodiversity in rapidly urbanizing landscapes of northeastern India.

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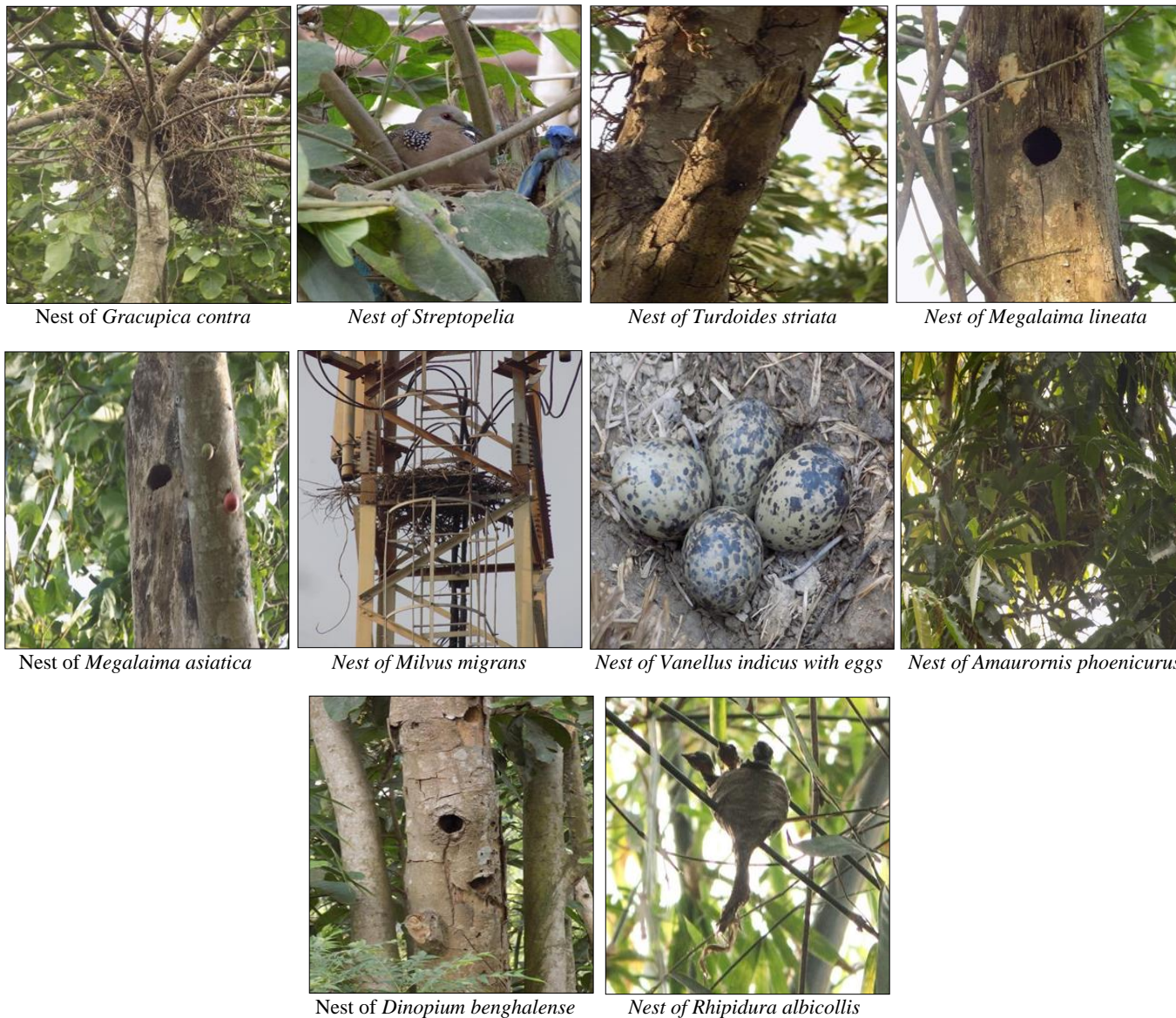


Fig 3: Various nests of Avian Fauna of Barpeta town

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