

# Ecological Study of Bird Diversity in Panje–Funde Wetlands, Uran

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**Abstract:** *Panje–Funde wetland, located in Uran region of Navi Mumbai along the west coast of India, is an ecologically important coastal wetland supporting rich avifaunal diversity. However, the region is presently undergoing rapid urbanization, industrialization, land reclamation, mangrove destruction, shipping activities, and port-related developmental projects, leading to fragmentation and degradation of natural habitats. Birds are considered important bioindicators of environmental quality because they are highly sensitive to ecological disturbances and habitat changes. Therefore, assessment of avian diversity is essential for understanding the ecological health and conservation value of wetlands.*

*The present study was undertaken to document the bird diversity of Panje–Funde wetland and its surrounding habitats. During the study period, a total of 122 bird species belonging to 15 orders and 40 families were recorded from the study area. The recorded avifauna included 54% resident species, 16% local migratory species, and 30% migratory species. The occurrence of several ecologically significant and migratory bird species such as Black-headed Ibis, Eurasian Spoonbill, Flamingos, Painted Storks, Rosy Starlings, sandpipers, and various water birds highlights the ecological importance of the wetland as a suitable feeding, breeding, and resting habitat for migratory avifauna.*

*The rich avian diversity observed in the study area indicates that Panje–Funde wetland serves as an important coastal ecosystem supporting both resident and migratory birds. However, increasing anthropogenic pressures may adversely affect the ecological stability and biodiversity of this sensitive habitat. The study emphasizes the urgent need for effective habitat management, wetland conservation, and biodiversity protection measures to preserve the ecological integrity of the Panje–Funde wetland ecosystem.*

**Keywords:** Avifauna, Wetland ecosystem, Migratory birds, Biodiversity, Panje–Funde wetland, Navi Mumbai.

## I. INTRODUCTION

Birds constitute an integral component of ecosystems and occupy various trophic levels in the food web. They play an important ecological role as predators, scavengers, pollinators, seed dispersers, and biological controllers of insect pests. Because of their sensitivity to environmental changes, birds are widely recognized as valuable bioindicators of habitat quality and ecosystem health. Variations in avian diversity, abundance, and distribution often reflect ecological changes occurring within natural habitats. Therefore, studies on bird diversity are essential for understanding ecosystem structure, ecological balance, and the impact of anthropogenic disturbances on biodiversity.

India is one of the richest countries in terms of avifaunal diversity and supports approximately 1300 species of birds, representing nearly 13% of the world's bird species. The country possesses diverse habitats such as forests, wetlands, grasslands, mangroves, estuaries, coastal regions, and mountains that support a wide variety of resident and migratory birds. Maharashtra state alone harbors more than 568 bird species belonging to 272 genera, 83 families, and 20 avian orders, indicating its remarkable ornithological richness. Wetlands and coastal ecosystems of Maharashtra are



especially important for migratory water birds that visit these habitats during winter seasons for feeding, nesting, and roosting.

Bird species often exhibit specific habitat preferences that vary seasonally depending on food availability, breeding requirements, climatic conditions, and migratory behavior. Wetlands are among the most productive ecosystems and provide ideal habitats for aquatic birds, shorebirds, waders, and migratory species. However, rapid developmental activities such as industrialization, urbanization, land reclamation, mangrove destruction, pollution, and port expansion have severely affected many wetland ecosystems, resulting in habitat loss and decline in avian populations. Coastal wetlands near metropolitan regions are particularly vulnerable to anthropogenic disturbances.

Navi Mumbai and Uran regions along the west coast of India are experiencing rapid infrastructural growth due to increasing urban expansion, industrial establishments, shipping activities, and port-related developments. Large-scale land filling, reclamation of wetlands, and cutting of mangroves are continuously altering the natural habitats of birds in this region. Such environmental disturbances pose serious threats to both resident and migratory avifauna dependent on wetland ecosystems.

Panje–Funde wetland is one of the ecologically significant wetlands located in Uran, Navi Mumbai, and serves as an important habitat for several resident and migratory bird species. The wetland supports diverse feeding grounds, mudflats, shallow water bodies, and mangrove-associated habitats that are suitable for water birds and shorebirds. Despite its ecological importance, the wetland faces increasing threats from developmental activities and habitat modification.

Several ornithologists and researchers have previously documented bird diversity from different parts of Maharashtra; however, limited information is available regarding the avifaunal diversity of Panje–Funde wetland. Therefore, the present study was undertaken to document the diversity, distribution, and ecological significance of bird species inhabiting the Panje–Funde wetland and surrounding areas. The study also aims to emphasize the need for conservation and sustainable management of this ecologically sensitive wetland ecosystem.

## II. STUDY AREA

Panje–Funde wetland is situated in the coastal region of Uran, Navi Mumbai, in Raigad district of Maharashtra along the west coast of India. The wetland is recognized as one of the most important bird habitats within the Mumbai Metropolitan Region (MMR) and serves as a major destination for bird watching and avifaunal studies. It is considered the last remaining extensive wetland ecosystem in Uran and supports a rich diversity of resident and migratory bird species, particularly during the winter season.

The core wetland area of Panje covers approximately 213 hectares and provides important feeding, roosting, and breeding grounds for numerous bird species. In addition, the surrounding buffer zone extends over nearly 157 hectares and is predominantly covered with mangrove vegetation. The wetland comprises a mosaic of diverse habitats including freshwater marshes, saline marshes, mudflats, mangroves, reed beds, grasslands, scrub vegetation, salt pans, paddy fields, coastal areas, and human settlements. Such habitat heterogeneity supports a wide range of aquatic birds, shorebirds, waders, and terrestrial avifauna. Owing to its ecological significance, the State Wildlife Board approved the proposal for establishing a bird sanctuary at Panje–Funde in the year 2015.

Geographically, the proposed Panje–Funde Bird Sanctuary is located between Uran town and the Jawaharlal Nehru Port Trust (JNPT) region (Lat. 18°53'52.38" N and Long. 72°57'07.07" E). The study area lies in close proximity to one of India's largest container handling ports, Jawaharlal Nehru Port (JNP), established on 26 May 1989. The port currently handles a major share of the country's containerized cargo and has undergone rapid expansion over recent



decades. Several port-related infrastructures such as APM Terminals, NSICT-DP World terminals, shipping yards, container freight stations, and associated industrial establishments are located in the surrounding area. Furthermore, the development of a Port-Based Multi-product Special Economic Zone (SEZ) at JNPT has accelerated industrialization and urbanization in Uran.

These developmental activities, including land reclamation, construction, shipping operations, and destruction of mangrove habitats, have exerted considerable pressure on the fragile wetland ecosystem and associated biodiversity. Despite increasing anthropogenic disturbances, the Panje–Funde wetland continues to support a large number of resident, local migratory, and winter migratory birds, making it an ecologically important habitat and a paradise for bird watchers and conservationists.

### III. MATERIALS AND METHODS

The present study was conducted over a period of one year from November 2017 to October 2018 to document the avifaunal diversity of the Panje–Funde wetland and adjoining habitats. Regular field surveys were carried out during early morning and evening hours, which are considered the most active periods for bird observation.

Birds were observed using binoculars and photographed using a digital camera for accurate identification and documentation. Species were recorded based on direct sightings as well as vocal calls heard in the field. Extensive field observations were made by walking through different habitats including wetlands, mudflats, mangroves, creek areas, grasslands, roadsides, forest patches, hills, and nearby human habitation zones.

Identification of bird species was carried out using standard ornithological field guides and taxonomic references such as Ali and Ripley (1983), Grimmett et al. (2000), and Rasmussen and Anderton (2005). The recorded bird species were systematically arranged family-wise following the classification provided by Manakadan and Pittie (2001, 2011).

The study aimed to assess the diversity, distribution, and habitat utilization patterns of resident and migratory birds inhabiting the Panje–Funde wetland ecosystem.

The list of birds documented during study period is as follows:

**Table 1. Checklist of Bird Species Recorded from Panje–Funde Wetland, Uran, Navi Mumbai, West Coast of India**

Sr. No.	Order	Family	Scientific Name	Common Name	Status*
1	Ciconiiformes	Ardeidae	<i>Ardea cinerea</i>	Grey Heron	LM
2			<i>Ardeola grayii</i>	Indian Pond Heron	R
3			<i>Ardea purpurea</i>	Purple Heron	R
4			<i>Butorides striatus</i>	Little Green Heron	R
5			<i>Egretta garzetta</i>	Little Egret	R
6			<i>Mesophoyx intermedia</i>	Median Egret	R
7			<i>Casmerodius albus</i>	Large Egret	LM
8			<i>Egretta gularis</i>	Western Reef Egret	R
9		Threskiornithidae	<i>Platalea leucorodia</i>	Eurasian Spoonbill	M
10			<i>Threskiornis melanocephalus</i>	Black-headed Ibis	M
11			<i>Plegadis falcinellus</i>	Glossy Ibis	LM
12			<i>Pseudibis papillosa</i>	Red-naped Ibis	LM
13		Ciconiidae	<i>Mycteria leucocephala</i>	Painted Stork	R
14			<i>Ciconia nigra</i>	Black Stork	M
15			<i>Ciconia episcopus</i>	Woolly-necked Stork	R
16			<i>Anastomus oscitans</i>	Asian Openbill	R
17	Anseriformes	Anatidae	<i>Aythya ferina</i>	Common Pochard	M



18			<i>Anser anser</i>	Greylag Goose	M
19			<i>Anser indicus</i>	Bar-headed Goose	R
20			<i>Anas crecca</i>	Eurasian Teal	M
21			<i>Anas clypeata</i>	Northern Shoveler	M
22			<i>Anas penelope</i>	Eurasian Wigeon	M
23			<i>Dendrocygna javanica</i>	Lesser Whistling Duck	M
24			<i>Anas poecilorhyncha</i>	Spot-billed Duck	M
25			<i>Tadorna ferruginea</i>	Ruddy Shelduck	M
26	Falconiformes	Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	R
27		Accipitridae	<i>Milvus migrans</i>	Black Kite	R
28			<i>Milvus milvus</i>	Black-eared Kite	M
29			<i>Haliastur indus</i>	Brahminy Kite	R
30			<i>Elanus caeruleus</i>	Black-shouldered Kite	LM
31			<i>Circus aeruginosus</i>	Marsh Harrier	M
32			<i>Circus macrourus</i>	Pallid Harrier	R
33			<i>Gyps bengalensis</i>	Indian White-backed Vulture	R
34			<i>Accipiter badius</i>	Shikra	R
35			<i>Aquila pennata</i>	Booted Eagle	R
36			<i>Spilornis cheela</i>	Crested Serpent Eagle	R
37			<i>Circaetus gallicus</i>	Short-toed Snake Eagle	R

**Status Abbreviations**

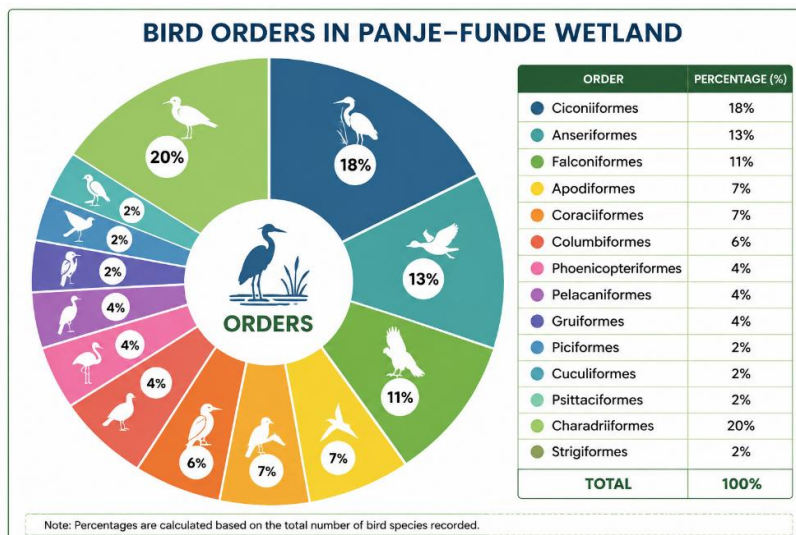
- **R** = Resident
- **LM** = Local Migratory
- **M** = Migratory

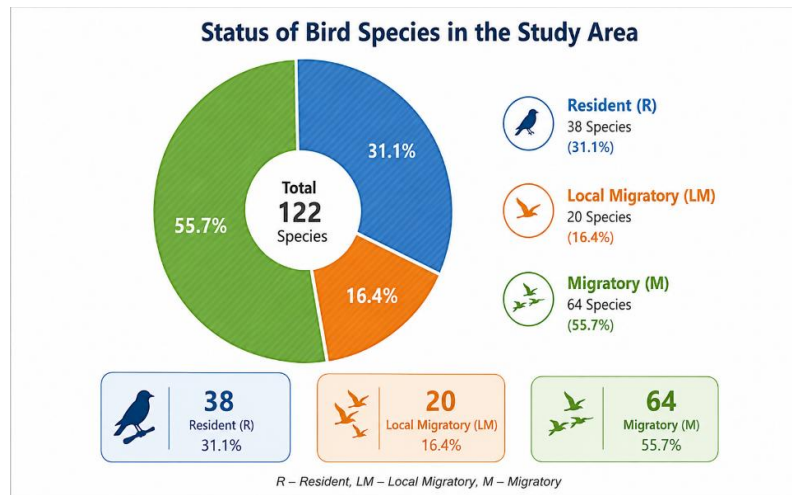
You can continue the remaining bird species in the same format for your research paper.

R- Regional

M- Migrant

LM- Local migrant





#### IV. DISCUSSION

The present study revealed a rich and moderately healthy avifaunal diversity in the Panje–Funde wetland ecosystem of Uran, Navi Mumbai. During the study period, a total of 122 bird species belonging to 15 orders, 40 families, and 93 genera were recorded from the study area. The diversity of birds observed in the wetland reflects the ecological significance of the habitat and its suitability for both resident and migratory avifauna.

Among the recorded avian groups, the order *Passeriformes* was found to be dominant, represented by 14 families, 25 genera, and 36 species. The dominance of passerine birds may be attributed to the availability of diverse feeding resources, nesting sites, and varied habitat conditions such as grasslands, scrub vegetation, mangroves, and human-associated landscapes. The second most dominant order recorded was *Charadriiformes*, represented by 5 families, 16 genera, and 22 species. The abundance of shorebirds and waders belonging to this order indicates the ecological importance of mudflats, shallow wetlands, and coastal habitats present in the Panje–Funde region.

Similar observations have been reported from other wetland ecosystems of Maharashtra. Singh and Ambavne (2013) documented 86 bird species belonging to 13 orders and 38 families from Thakurli, District Thane, where *Passeriformes* dominated with 40 species belonging to 18 families, followed by *Charadriiformes* represented by 9 species under 5 families. Comparable results were also reported by Kadam and Dhar (2017) from Bordi coastal region in Palghar district of Maharashtra, where the order *Passeriformes* showed maximum species representation. Johnson et al. (2015) recorded 93 bird species belonging to 11 orders and 36 families from salt pan habitats, with *Passeriformes* contributing the highest diversity. These studies support the present findings and indicate that passerine birds generally dominate coastal and wetland ecosystems due to their adaptability to varied environmental conditions.

The avifaunal composition recorded during the study comprised approximately 54% resident species, 16% local migratory species, and 30% migratory species. The presence of several ecologically important migratory and water bird species such as Black-headed Ibis, Eurasian Spoonbill, Flamingos, Painted Storks, Rosy Starlings, sandpipers, and other waders demonstrates the importance of Panje–Funde wetland as a suitable feeding, roosting, and resting habitat for migratory birds. Most winter migratory birds were observed to arrive during September and remain in the area until April, indicating the seasonal importance of the wetland ecosystem.



The wetland provides a mosaic of habitats including mudflats, mangroves, shallow water bodies, grasslands, salt pans, and paddy fields, which collectively support a high diversity of avifauna. However, rapid urbanization, industrialization, land reclamation, port expansion, shipping activities, and destruction of mangrove vegetation around Uran pose serious threats to the ecological stability of the region. Continuous habitat degradation may adversely affect bird populations, particularly migratory species dependent on wetlands for seasonal survival. Therefore, regular ecological monitoring and habitat conservation are essential for maintaining the biodiversity and ecological integrity of the Panje–Funde wetland ecosystem.

## V. CONCLUSION

The present study documented a rich diversity of resident, local migratory, and migratory bird species from the Panje–Funde wetland of Uran, Navi Mumbai. The occurrence of 122 bird species indicates that the wetland serves as an ecologically significant habitat supporting a wide variety of avifauna throughout the year. The presence of several migratory water birds and waders further highlights the importance of the wetland as a crucial feeding and roosting ground for migratory species during winter months.

The study clearly demonstrates the ecological value of the Panje–Funde wetland in maintaining avian biodiversity within the Mumbai Metropolitan Region. The diverse habitats present in the area, including wetlands, mudflats, mangroves, grasslands, and salt pans, provide favorable environmental conditions for different groups of birds. However, increasing anthropogenic pressures such as industrialization, urbanization, land reclamation, and port-related developmental activities threaten the ecological balance and biodiversity of this sensitive ecosystem.

Continuous monitoring and long-term ecological studies are necessary to better understand the population dynamics, habitat utilization, and conservation status of bird species inhabiting the region. Public awareness and community participation in conservation activities are also essential for the sustainable management of the wetland ecosystem.

The study emphasizes the urgent need for effective habitat protection, wetland conservation, and biodiversity management programs to preserve the ecological integrity and avifaunal diversity of the Panje–Funde wetland.

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