



Biodiversity Insights: Avifauna of the Mumbra Mangrove Wetlands, Maharashtra, India

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ABSTRACT

Mangroves provide feeding, roosting and breeding sites for many resident and migratory species of birds. Birds are key components of food-chain; maintain biodiversity and ecological processes in mangrove ecosystems; and serve as indicators of habitat quality. Observations of Avifauna by direct visual method was done from three selected sites along the Mumbra mangrove ecosystem during post-monsoon (Nov. to Dec. 2023) and pre-monsoon (Jan. to April 2024). The study area is blessed with large wetlands and mangrove region which attracts variety of birds. The presents study of avifauna of Mumbra Mangrove Region give record of 30 species from 7 orders and 15 families. The order Charadriiformes and Passeriformes dominate the study area, order Charadriiformes contributing 8 species and Passeriformes contributing 11 species which together form 64% of all species recorded. Study area provides suitable habitat for 16 migratory birds (53.33%), 3 resident migratory species (10%) and 11 species of resident birds (37%). Majority of birds were observed during post monsoon as compared to pre-monsoon season.

Keywords: Mangrove Ecosystem, Avifauna, Mumbra.

INTRODUCTION

The safeguarding of biological diversity has grown to be an international issue. The variety of life forms found in a particular system, biome, or the entire earth is referred to as biodiversity. It acts as a gauge of the relative diversity of species found in different types of ecosystems (Emerson & Kolm, 2005). Biodiversity is not uniformly spread over the earth. It becomes increasingly rich in the tropics. India, being a tropical country, has a particular identity, not only because of its geography, history, and culture, but also because of the vast diversity of its natural ecosystems (Gentry, 1988). The earth's existing biodiversity consists of biological species that have evolved over about 3.5 billion years (Alroy et al., 2001). Birds are among the world's most diversified bird species. India contains approximately 1,288 bird species organized into 89 families and 17 orders. Among them, 900 are residents, while the remainder are

migratory (Diamond, 1987) (Jayson & Mathew, 2000). Each bird species has its own preferences and demands for eating, roosting, and nesting (Ricklefs, 2003) (Ali, 1977). As the variety of vegetation increases, so does the diversity of avian life. Vegetation diversity is intimately tied to avian diversity (Ericson et al., 2003).

India is rich in avifaunal biodiversity, with 1,300 bird species reported, accounting for 13% of the total number of bird species known on the earth (Grimmett, et al., 1998). Maharashtra state has 568 species, split into 272 genera, 83 families, and 20 bird orders (Ishtiaq et al., 2011). Birds have an essential role in ecosystems, contributing at various stages of the food chain. Avian diversity can be used as an indicator of an ecosystem and environment (Morrison, 1986). Bharucha & Gogte (1990), Gole (1998), Wadatkar (2001), Kasambe & Wadatkar (2007) and Malwadkar (2011) had collected considerable data on bird diversity in Maharashtra. Similar to the metropolis, Mumbai's suburbs are experiencing immigration issues, which is resulting in a lack of available land for residential and commercial construction. Both migratory and resident birds are impacted by the ongoing fragmentation (building) of wooded areas to satisfy this demand. The diversity and impact of avifauna in an environmentally sensitive area are examined in this study in relation to human activities. A vital biological element of the coastal wetland environment, coastal birds have important aesthetic, recreational, and financial benefits. Compared to beaches, mudflats, and saltmarshes, mangroves feature a more varied bird population (Macarthur & Macarthur, 2013). Numerous tree-nesting birds are able to carry out important breeding operations in mangroves. There is little information available about the birds linked with mangroves in India. Except for a few studies, like 53 species from Bay Islands (Samanth, 1985), 24 species that migrate from the Sunderbans (Nasker, 1987), and 166 species from the mangroves of Bhitarkanika.

Mangroves are nurseries for marine life, and provide food for wetland aquatic species, birds and mammals. They filter toxins like heavy metals and prevent their entry into the food chain. Mangroves are important sites for fish breeding and for crustaceans. The health

of mangrove ecology directly impacts fishing livelihoods, which are almost totally dependent on daily fish catch. The ecologically significant wetlands around Mumbai are being reclaimed for parking lots and real estate projects despite the court ban. Environmental damage resulting from depleting mangroves has several implications. Mangroves also play important role in flood control and their destruction had resulted in flooding in Mumbai in 2018. Many ecological and biodiversity studies have been carried out on Thane creek but there is dearth of studies on mangrove wetlands near Mumbra. Thus present work will serve as baseline study for the given area. As reclamation of land and construction activity in Mumbra are steadily increasing along with the open sewage disposal problem, hence effects of anthropogenic activities on mangrove ecology will also be studied and protection measure envisioned.

MATERIALS AND METHODS

Observation of Avians by direct visual method was done along the selected paths all along the mangrove found in and around the Mumbra region. Because of the scarcity of many avifauna species during the monsoon, pre-monsoon and post-monsoon times were chosen for avifauna biodiversity research. Monitoring of paths was in the morning between 06.00 to 11.00 am during post-monsoon (November to December) and pre-monsoon (January to April). Nikon camera and Canon 500 D were used for photography. For photo and sound identification of birds, the Merlin app were used. According to the temporal occurrence and observations, the status of bird species was categorized into Resident (Re), Resident Migrant (RM), and Migrant (M).

The IUCN status of each species observed was obtained from IUCN Red List (2021).

Study Area:

The scientific survey of avian diversity at Mumbra Mangrove Region was conducted during November 2023 to April 2024. The study area is blessed with large wetlands and mangrove region which attracts variety of birds. Three suitable sites were selected for the study of avian biodiversity.



RESULTS AND DISCUSSION

The present study of avifauna of Mumbra Mangrove Region give record of 30 species from 7 orders and 15 families. The order Charadriiformes and Passeriformes dominate the study area, order Charadriiformes contributing 8 species and Passeriformes contributing 11 species which together form 64% of all species recorded (Fig.2 and Table.1). The taxonomic breakdown of recorded bird species at Mumbra mangrove wetlands is as follows: family Scolopacidae exhibited the highest richness with seven species, followed by Ardeidae with six species, while Sturnidae, Corvidae, Cisticolidae and Anatidae family

were represented by two species each. Nine families, namely Phalacrocoracidae, Columbidae, Recurvirostridae, Cuculidae, Laniidae, Passeridae, Muscicapidae, Pycnonotidae and Oriolidae were documented with a single species each (Fig.3). Study area provides suitable habitat for 16 migratory birds (53.33%), 3 resident migratory species (10%); 11 species of resident birds (37%) (Fig.4). Based on the updated IUCN Red List (2021), 27 species were classified under the "Least Concern" category, while two species were categorized as "Near Threatened" (Table 1). Majority of birds were observed during post monsoon as compared to pre-monsoon season (Table.1).

Table 1: Consolidated checklist of birds of Mumbra Mangrove Region

Sr. No.	Order Family	Common Name <i>Scientific Name</i>	SS (Seasonal Status) MS (Migratory Status) IS (IUCN Status)	Site-wise Status - Present (✓) - Absent (X)
1.	Order: Suliformes Family: Phalacrocoracidae	1.1 Little cormorant <i>Microcarbo niger</i>	SS - PRM, POM MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
2.	Order: Pelecaniformes Family : Ardeidae	2.1 Indian pond heron <i>Ardeola grayii</i>	SS - PRM, POM, MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - ✓
		2.2 Little egret <i>Egretta garzetta</i>	SS - PRM, POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - ✓
		2.3 Squacco heron <i>Ardeola ralloides</i>	SS - PRM, POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - ✓
		2.4 Great blue heron <i>Ardea herodias</i>	SS - PRM, POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		2.5 Green Heron <i>Butorides virescens</i>	SS - PRM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X

Table 1: Continued...

Sr. No.	Order Family	Common Name <u>Scientific Name</u>	SS (Seasonal Status) MS (Migratory Status) IS (IUCN Status)	Site-wise Status - Present (✓) - Absent (X)
		2.6 Black-crowned Night-heron <u>Nycticorax nycticorax</u>	SS - PRM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
3.	Order: Columbiformes Family: Columbidae	3.1 Blue rock pigeon (Rock dove) <u>Columba livia</u>	SS - PRM MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - ✓
4.	Order: Anseriformes Family: Anatidae	4.1 Whistling-duck <u>Dendrocygna javanica</u>	SS - PRM MS - M IS - LC	SITE V - X SITE R - X SITE C - ✓
		4.2 Greater White-Goose <u>Anser albifrons</u>	SS - PRM MS - M IS - LC	SITE V - X SITE R - X SITE C - ✓
5.	Order: Charadriiformes Family: Scolopacidae	5.1 Black-tailed Godwit <u>Limosa limosa</u>	SS - POM MS - M IS - NT	SITE V - ✓ SITE R - ✓ SITE C - X
		5.2 Common Greenshank <u>Tringa nebularia</u>	SS - POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		5.3 Common Sandpiper <u>Actitis hypoleucos</u>	SS - POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		5.4 Marsh Sandpiper <u>Tringa stagnatilis</u>	SS - POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		5.5 Spotted Sandpiper <u>Actitis macularia</u>	SS - POM MS - RM IS - LC	SITE V - X SITE R - ✓ SITE C - ✓
		5.6 Wood sandpiper <u>Tringa glareola</u>	SS - POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		5.7 Red knot <u>Calidris canutus</u>	SS - POM MS - M IS - NT	SITE V - ✓ SITE R - ✓ SITE C - X
	Order: Charadriiformes Family: Recurvirostridae	5.8 Black Winged Stilt <u>Himantopus himantopus</u>	SS - POM MS - RM IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
6.	Order: Cuculiformes Family: Cuculidae	6.1 Greater Coucal <u>Centropus sinensis</u>	SS - POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
7.	Order: Passeriformes Family: Laniidae	7.1 Long Tailed Shrike <u>Lanius schach</u>	SS - POM MS - RM IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
	Order: Passeriformes Family: Passeridae	7.2 House sparrow <u>Passer domesticus</u>	SS - PRM, POM MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - ✓
	Order: Passeriformes Family: Cisticolidae	7.3 Ashy prinia <u>Prinia socialis</u>	SS - POM MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		7.4 Plain prinia <u>Prinia inornata</u>	SS - POM MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
	Order: Passeriformes Family: Muscicapidae	7.5 Oriental magpie-robin <u>Copsychus saularis</u>	SS - POM MS - Re IS - LC	SITE V - ✓ SITE R - ✓ SITE C - X
		7.6 Rosy starling <u>Pastor roseus</u>	SS - PRM, POM MS - M IS - LC	SITE V - ✓ SITE R - ✓ SITE C - ✓

Table 1: Continued...

Sr. No.	Order Family	Common Name <i>Scientific Name</i>	SS (Seasonal Status) MS (Migratory Status) IS (IUCN Status)	Site-wise Status - Present (✓) - Absent (X)
	Order: Passeriformes Family: Sturnidae			
		7.7 Common myna <i>Acridotheres tristis</i>	SS - PRM, POM MS – Re IS - LC	SITE V - ✓ SITE R – ✓ SITE C - ✓
	Order: Passeriformes Family: Corvidae			
		7.8 House crow <i>Corvus splendens</i>	SS - PRM, POM MS – Re IS - LC	SITE V - ✓ SITE R – ✓ SITE C - ✓
		7.9 Jungle crow <i>Corvus macrorhynchos</i>	SS - PRM, POM MS – Re IS - LC	SITE V - ✓ SITE R – ✓ SITE C - ✓
	Order: Passeriformes Family: Pycnonotidae			
		7.10 Red vented bulbul <i>Pycnonotus cafer</i>	SS - POM MS – Re IS - LC	SITE V - ✓ SITE R – ✓ SITE C - X
	Order: Passeriformes Family: Oriolidae			
		7.11 Indian Golden oriole <i>Oriolus kundoo</i>	SS - POM MS – M IS - LC	SITE V - ✓ SITE R – ✓ SITE C - X

SS (Seasonal Status) - PRM (Pre monsoon), POM (Post monsoon)
MS (Migratory Status) - Re (Resident), M (Migratory), RM (Residential Migratory)
IS (IUCN Status) – LC (Least Concern), NT (Near Threatened)
PS (Present Status) - SITES – V (Visarjan Ghat), R (Retibunder), C (Chuha Bridge)

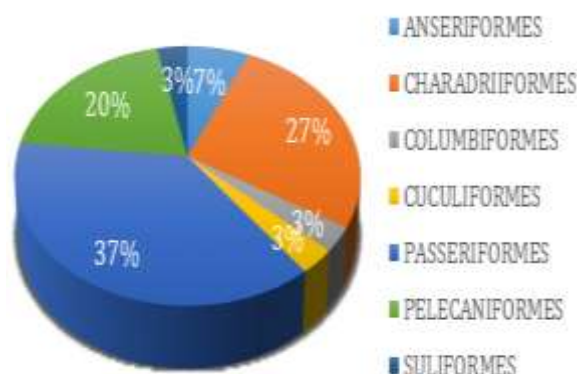


Fig.2: Order-wise depiction of avian diversity of Mumbra Mangrove Region

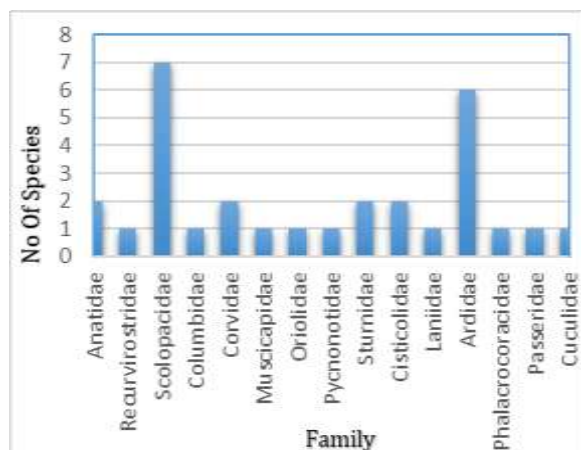


Fig.3: The number of species recorded per family along the Mumbra mangrove region during the study period

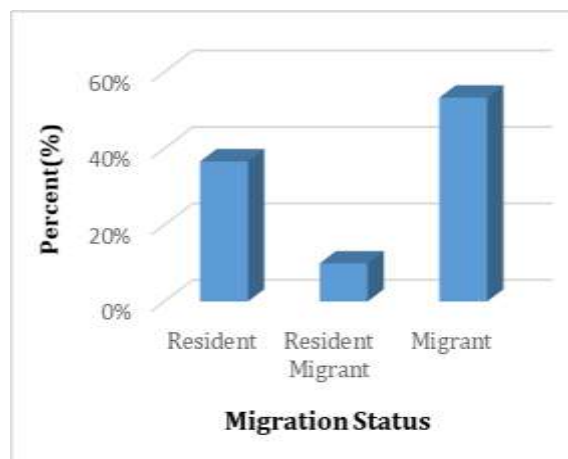


Fig. 4: Migration status of bird species in Mumbra Mangrove Region

This study reveal that sites Visarjan ghat (V) & Retibunder (R) exhibit higher avifauna biodiversity compared to site Chuha Bridge (C), primarily due to varying levels of anthropogenic activity & human interference. Majority of The wide mudflats at all three sites are rich in invertebrates from the phyla Annelida, Arthropoda, and Mollusca, which are commonly consumed by shorebirds. Wetlands' micro faunal variety contributes significantly to the ecosystem's sustainability.

In the present study Mumbra wetlands have good carrying capacity for migratory waders and avifauna. Wetlands, despite their importance in supporting ecological systems, are the most endangered and quickly degrading ecosystems. Several biological and climatic factors lead to the disturbance of wetlands. Anthropogenic activities like idol immersion and sand mining significantly impact the habitat of aquatic birds. Human actions have a direct impact on bird survival and reproduction, threatening their very existence. (Green and Hirons, 1999).

CONCLUSION

The study revealed that large number of water dependent birds were recorded during the winter season, though continuous monitoring of this site is required to reveal more information regarding avian and other fauna around the Mumbra Mangrove region. The study did reveal the importance of the habitat provided by the wetlands in terms of bird species diversity. The dominance of water bird species further emphasises the need to conserve such habitats that also support the livelihood of the local inhabitants.

The Mumbra mangrove wetlands have been severely damaged by anthropogenic activity and sand mining, which has reduced the diversity of the avifauna and damaged the region's natural equilibrium. These important habitats urgently need to be protected through conservation initiatives.

The findings of this study will help in the ecological management and restoration of natural habitat in wetlands, as well as the conservation of migratory shore birds.

Conflict of Interest: The authors declare no conflict of interest in relation to this research.

Data Availability Statement: Not applicable.

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