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Research paper

Avian Diversity in and around Narayanmali Village, Ratnagiri, Maharashtra: A Comprehensive Study

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ABSTRACT

This research focuses on the birdlife found in and around Narayanmali village, located along the Kajali River in Ratnagiri district, Maharashtra. The study was conducted between September 2022 and February 2023, capturing a snapshot of the rich avian diversity in the area. A total of 60 bird species from 8 orders and 13 families were documented, including both resident and migratory birds. The diverse habitats in the region—ranging from estuaries and mangroves to agricultural and forested areas—provide a haven for many species. Narayanmali is not only an important home for local birds but also serves as a key stopover for migratory species. This research highlights the importance of conserving these unique ecosystems and provides insight into the bird migration patterns in the region. It also emphasizes the need for sustainable practices to protect the area's ecological balance and biodiversity.

1. Introduction

Birds play a crucial role as ecological indicators, offering insights into the overall health of the environment. Various habitats, such as forests and water bodies, including dams and reservoirs, act as magnets for birds, creating favourable conditions for their life cycles (Robertson and Hackwell, 1995). The presence or absence of particular bird species within an ecosystem function as a key indicator of stress and disturbance in the area. Given their diverse species and ecological sensitivity, birds play a critical role in signalling the environmental health of a region.

India boasts a remarkable avian diversity, hosting 1,353 bird species, constituting approximately 12.40% of the global bird population. Of these 1,353 bird species, 78 (5%) are endemic to the country. The avifauna of India comprises 1369 species, 83 of which are endemic, 2 of which are extinct, 212 of which are critically endangered. (Puri, 2007; Ranjit and Asif, 2020; Denis Lepage, 2022). Alarming trends in global bird populations, with a projected extinction of 1,200 species in the next century, underscore the urgent need for conservation efforts (Gill, 1995). Numerous factors contribute to the decline in bird species diversity worldwide, encompassing habitat loss, overhunting, urbanisation, industrialisation, pollution, inter- and intra-animal competition, predation, oil spills in the ocean, and pesticide use (Moore et al., 2008). In this context, it is imperative to amend legislation, preserve habitats, and reintroduce birds

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into captivity, in collaboration with government and non-governmental organisations, to protect birds and their habitats.

Maharashtra, India's third-largest state, boasts diverse landscapes—from forests to wetlands—making it an ideal habitat for a variety of bird species. Common sightings include the Asian Paradise Flycatcher, Black-winged Kite, Common Kingfisher, Indian Pitta, and Red-vented Bulbul. Notably, Maharashtra is also home to rare and endangered birds such as the Indian Vulture, Lesser Florican, and Beautiful Sunbird (Puri, 2007). This rich avian diversity makes Maharashtra a haven for bird enthusiasts and nature lovers.

Narayanmali, a charming village in Ratnagiri, Maharashtra, India, is renowned for its natural beauty. Notably, it features a narrow strip of mangrove vegetation along its northern border, making it stand out in the Konkan region. Home to diverse mangrove species like *Sonneratia alba* and *Rhizophora apiculata*, Narayanmali's basin area thrives with biodiversity. This rich mangrove ecosystem makes the village a haven for various bird species, attracting bird enthusiasts and researchers alike.

This research, conducted in Narayanmali village, Ratnagiri district, spanning January to December 2023, focuses on documenting bird species diversity. Narayanmali, known for its natural beauty and sacred significance, provides a unique habitat for avian life. The study addresses the imperative to conserve avian biodiversity, presenting a comprehensive bird checklist for the area. Recognizing a research gap, a brief survey documented avifaunal diversity, offering insights into the avian population. The research emphasizes the importance of understanding and preserving avian life in distinctive habitats like Narayanmali.

2. Materials and Methods

2.1 Study Area

A bird species survey was conducted in Narayanmali village, Ratnagiri district. This region is chosen for its unique blend of natural beauty and cultural significance. The geographical coordinates (16.058989°N, 73.018046°E), topography, and climatic conditions of the region were recorded. Situated 4 km east of Ratnagiri's district headquarters, Narayanmali features a well-developed mangrove patch, a crucial ecosystem attracting a diverse array of bird species adapted to coastal habitats.

Fig. 1 Aerial View of Narayanmali and the Kajali River, Ratnagiri, Maharashtra

This survey aimed to contextualise the area's bird diversity and its geographical and ecological features. Near the Narayanmali village, there is a basin area which is dominated by the luxuriant patch of *Sonneratia alba*, *Rhizophora apiculata, Ceripos tagal*, *Exocoecaria agallocha, Aegiceras corniculatum* and *Rhizophora mucronata* are growing well.

2.2 Survey Method

To observe bird species, a visual encounter survey method was utilized, employing systematic transect walks and stationary point counts. This approach facilitated the direct visual identification of bird species. The survey included short-strip transect counts (SSTC) using the continuous walk method, where observers walked continuously for 10 minutes, documenting the bird species encountered. During the SSTC, an average distance of 50 meters was covered in the ten-minute interval, and all birds within a 20-meter band were recorded. This method allowed for a comprehensive assessment of bird species diversity in the surveyed area (Bibby *et al*., 2000).

2.3 Data Collection

Data on bird species diversity was systematically collected over 12 months, spanning from January to December 2023—the survey aimed to encompass various seasons to capture both resident and migratory bird species. Observations were conducted during morning and evening hours, optimising the likelihood of encountering a diverse range of avian species. Specifically, the survey took place between 6:00 to 8:00 am and 4:00 to 6:00 pm. Each day, data on bird species was meticulously collected for four hours, and this survey occurred on four days per month. This comprehensive and structured approach ensured a thorough and representative understanding of the avian diversity in the surveyed area across different seasons (Sutherland, 2006).

2.4 Data Analysis

Photography was the primary method for documenting bird species over 12 months (January to December 2023). Binoculars and field guides (Ali, 1980) were used for on-the-spot identification. The checklist followed Ali's guidelines (1980, 2002), categorising species as abundance (A), Common (C), or Rare (R). Recorded species were grouped by families, and richness and diversity indices were calculated. This comprehensive approach ensured a thorough understanding of bird dynamics in the surveyed area.

3. Results

3.1 Species Richness

A total of 60 bird species were identified during the study period. These belonged to 32 different families of 12 orders, showcasing a diverse avian community in Narayanmali. Passeriformes- 17 family, 26 species Muscicapidae- 5 maximum no. of species Coraciiformes- 3 family with 4 species of birds Accipitriformes- Accipitridae- 5 species of birds Cuculiformes-Cuculidae- 4 species of birds Pelecaniformes-Ardeidae- 4 (**Fig. 1**)

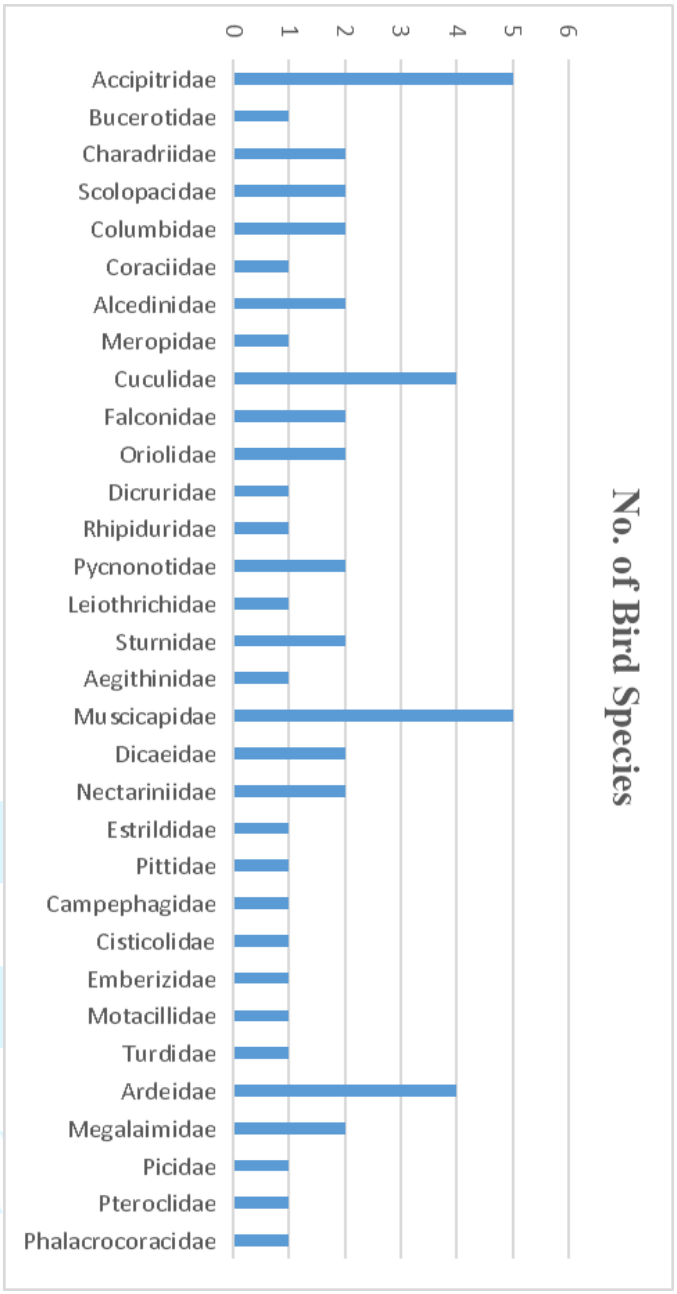

Fig. 2 Distribution of Bird Species Across Various Families in Narayanmali

The study documented the presence of seasonal visitors, highlighting the ecological significance of Narayanmali as a crucial migratory stopover (Table 1).

Table 1 Avian Species Documented in Narayanmali Village, Ratnagiri District, with Habitat, Behaviour, and Conservation Status

Sr. No.	Order	Family	Common Name	Scientific Name	Status		
					Habit	Habitat	Category
1.	Accipitriformes	Accipitridae	Crested Honey-buzzard	*Pernis ptilorhynchus*	CV	Gr	R
2.	Accipitriformes	Accipitridae	Changeable Hawk-Eagle	*Nisaetus cirrhatus*	CV	SF	R
3.	Accipitriformes	Accipitridae	-Booted Eagle	*Hieraaetus pennatus*	CV	PL	R
4.	Accipitriformes	Accipitridae	Shikra	*Accipiter badius*	CV	Ag, Mg	R
5.	Accipitriformes	Accipitridae	Brahminy Kite	*Haliastur indus*	CV	Hh, Mc	R
6.	Bucerotiformes	Bucerotidae	Malabar Pied-Hornbill	*Anthracoceros coronatus*	OV	SF, Ag	R
7.	Charadriiformes	Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	OV	Ag, Sw	R
8.	Charadriiformes	Charadriidae	Pacific Golden Plover	*Pluvialis fulva*	OV	MD	R
9.	Charadriiformes	Scolopacidae	Wood sandpiper	*Tringa glareola*	OV	MD	R
10.	Charadriiformes	Scolopacidae	Dunlin	*Calidris alpina*	OV	MD	R
11.	Columbiformes	Columbidae	Spotted Dove	*Spilopelia chinensis*	OV	Ag, Gr	R
12.	Columbiformes	Columbidae	Red turtle dove	*Streptopelia tranquebarica*	OV	Hh	R
13.	Coraciiformes	Coraciidae	Indian roller	*Coracias benghalensis*	OV	Ag, SF	R
14.	Coraciiformes	Alcedinidae	Common Kingfisher	*Alcedo atthis*	PV	Mg, FW	R
15.	Coraciiformes	Alcedinidae	White-throated Kingfisher	*Halcyon smyrnensis*	CV	Mg, Fw	R
16.	Coraciiformes	Meropidae	Asian Green Bee-eater	*Merops orientalis*	IV	Sd, Se	R
17.	Cuculiformes	Cuculidae	Asian Koel	*Eudynamys scolopaceus*	OV	Gr, Th	R
18.	Cuculiformes	Cuculidae	Jocobin cuckoo	*Clamator jacobinus*	IV	SE	R
19.	Cuculiformes	Cuculidae	Eurasian cuckoo	*Cuculus canorus*	IV	SE	R
20.	Cuculiformes	Cuculidae	Greater Coucal	*Centropus sinensis*	OV	Tc, Se	R
21.	Cuculiformes	Cuculidae	Black-headed Cuckoo	Cuculus nigrorufus	IV	SE	R
22.	Falconiformes	Falconidae	Amur falcon	*Falco amurensis*	CV	PL	R
23.	Falconiformes	Falconidae	Common crestel	*Falco tinnunculus*	IV	Mc, Gi	LM
24.	Passeriformes	Oriolidae	Indian Golden Oriole	*Oriolus kundoo*	OV	SE	R
25.	Passeriformes	Oriolidae	Black hooded oriole	*Oriolus xanthornus*	OV	SF	R
26.	Passeriformes	Dicruridae	Ashy Drongo	*Dicrurus leucophaeus*	IV	SF	R
27.	Passeriformes	Rhipiduridae	Spot-breasted Fantail	*Rhipidura albogularis*	IV	SF	R
28.	Passeriformes	Pycnonotidae	Red-whiskered Bulbul	*Pycnonotus jocosus*	OV	Sd, Ag	R
29.	Passeriformes	Pycnonotidae	White-browed Bulbul	*Pycnonotus luteolus*	OV	SF	R
30.	Passeriformes	Leiothrichidae	Jungle Babbler	*Argya striata*	OV	SF	R
31.	Passeriformes	Sturnidae	Jungle Myna	*Acridotheres fuscus*	OV	SF	R
32.	Passeriformes	Sturnidae	Chestnut-tailed starling	*Sturnia malabarica*	OV	Gr	R
33.	Passeriformes	Aegithinidae	Common Iora	*Aegithina tiphia*	IV	Ag, Tc	R
34.	Passeriformes	Muscicapidae	Oriental Magpie-Robin	*Copsychus saularis*	IV	Gr, Ag	R
35.	Passeriformes	Muscicapidae	White-rumped Shama	*Copsychus malabaricus*	IV	SF	R
36.	Passeriformes	Muscicapidae	Tickell's Blue Flycatcher	*Cyornis tickelliae*	IV	SF	R
37.	Passeriformes	Muscicapidae	Verditer Flycatcher	*Eumyias thalassinus*	IV	SF	R
38.	Passeriformes	Muscicapidae	Siberian stonechat	*Saxicola maurus*	IV	SF	R
39.	Passeriformes	Dicaeidae	Nilgiri Flowerpecker	*Dicaeum concolor*	NV	SF	R
40.	Passeriformes	Dicaeidae	Pale-billed flowerpecker	*Dicaeum erythrorhynchos*	NV	SF	R
41.	Passeriformes	Nectariniidae	Purple Sunbird	*Cinnyris asiaticus*	OV	Se, Sd	R
42.	Passeriformes	Nectariniidae	Vigors's Sunbird	*Aethopyga vigorsii*	IV	SF	R
43.	Passeriformes	Estrildidae	White-rumped munia	*Lonchura striata*	OV	SF	R
44.	Passeriformes	Pittidae	Indian Pitta	*Pitta brachyura*	IV	SF	R

45.	Passeriformes	Campephagidae	Small minivet	*Pericrocotus cinnamomeus*	IV	SF	R
46.	Passeriformes	Cisticolidae	Grey-breasted Prinia	*Prinia hodgsonii*	IV	SF	R
47.	Passeriformes	Emberizidae	Black-headed Bunting:	*Emberiza melanocephala*	OV	SF	R
48.	Passeriformes	Motacillidae	Grey Wagtail	*Motacilla cinerea*	IV	SF	R
49.	Passeriformes	Turdidae	Indian Blackbird	*Turdus simillimus*	OV	SF	R
50.	Passeriformes	Sturnidae	Malabar Starling	*Gracupica malabarica*	OV	SF	R
51.	Pelecaniformes	Ardeidae	Little Egret	*Egretta garzetta*	CV	WL	WM
52.	Pelecaniformes	Ardeidae	Indian Pond Heron:	*Ardeola grayii*	CV	WL	WM
53.	Pelecaniformes	Ardeidae	Great White Egret	*Ardea alba*	CV	WL	WM
54.	Pelecaniformes	Ardeidae	Eastern Cattle Egret	*Bubulcus coromandus*	OV	WL	WM
55.	Piciformes	Megalaimidae	Coppersmith Barbet	*Psilopogon haemacephalus*	OV	SF	R
56.	Piciformes	Megalaimidae	Brown-headed Barbet	*Psilopogon zeylanicus*	OV	SF	R
57.	Piciformes	Picidae	Eurasian Wryneck	*Jynx torquilla*	IV	SF	R
58.	Psittaciformes	Psittaculidae	Vernal Hanging Parrot	*Loriculus vernalis*	HV	SF	R
59.	Pterocliformes	Pteroclididae	Chestnut-bellied Sandgrouse	*Pterocles exustus*	HV	SF	R
60.	Suliformes	Phalacrocoracidae	Little Cormorant	*Microcarbo niger*	PISV	WL	R

4. Discussion

The results of this study highlight the avian diversity in Narayanmali, with notable observations of both common resident species and seasonal migratory visitors. The presence of a rich array of bird species throughout the year underscores the ecological significance of this area, aligning with various studies that emphasize the role of diverse habitats in supporting bird populations.

4.1 Common Bird Species

Among the consistently observed species in Narayanmali were the Brahminy Kite, Coppersmith Barbet, Common Kingfisher, Wood Sandpiper, Indian Roller, Asian Koel, and Purple-rumped Sunbird. These birds are adaptable and thrive in both natural and altered landscapes, often serving as "indicator species" reflecting ecosystem health (Ali, 1980). The frequent sightings suggest that Narayanmali offers a stable habitat, particularly benefiting species like the Common Kingfisher, which favours water bodies (Ali, 1980). Similar species have been noted in other Maharashtra wetlands (Kulkarni, 2015; Gole, 2000). The presence of the Purple-rumped Sunbird highlights the region's healthy vegetation, supporting findings by Rahmani (2007) on the importance of habitat conservation for avian populations in Western India.

4.2 Seasonal Visitors

The documentation of migratory species, such as the Crested Honey-buzzard and Pacific Golden Plover, highlights Narayanmali's significance as an important migratory stopover. This finding aligns with earlier research that identifies Maharashtra as a key region along the Central Asian Flyway (BirdLife International, 2017). Migratory birds rely on suitable stopover sites to rest and refuel, and Narayanmali appears to provide essential resources during these critical periods.

Similar migratory patterns have been observed along the Indian coastline, including the Pacific Golden Plover (Grimmett et al., 2011). The Crested Honey-buzzard's migration, dependent on forested areas, has been documented by Sivakumar and Jayapal (2013). These observations underline Narayanmali's ecological importance and the need for habitat conservation.

Compared to other studies, the diversity observed in Narayanmali is notable but consistent with findings from similar ecosystems in India. For example, Pande *et al*., (2003) reported a comparable mix of resident and migratory species in Pune's wetlands. This emphasizes the critical role of well-preserved habitats in supporting bird biodiversity.

Additionally, Moore et al., (2008) highlight that even small, suitable habitats can serve as crucial stopover points for migratory birds. The presence of

these species in Narayanmali reinforces the importance of conserving such vital habitats for global migration patterns.

4.3 Ecological Significance

The diverse bird species observed in Narayanmali underscore the ecological health of the region. The study documented 12 orders, 32 families, and 60 species, with Passeriformes being the most prevalent, encompassing 17 families and 26 species. Notably, the family Muscicapidae, with 5 species, reflects the area's diverse feeding niches and ecological suitability (Grimmett, Inskipp, & Inskipp, 2011; Ali, 1980).

4.4 Conservation Implications

Narayanmali's blend of natural beauty and minimal human disturbance makes it a key site for avian conservation. Conservation efforts should focus on preserving this habitat to maintain ecological balance and support both migratory and resident species (Pande, Deshmukh, & Pawashe, 2003; Moore et al., 2008). This study's data can guide conservation programs aimed at protecting similar ecosystems (Rahmani, 2007).

4.5 Educational Significance

The research provides a solid basis for educational and awareness initiatives, promoting conservation among students and local communities. By showcasing the bird species of Narayanmali, the study highlights the importance of biodiversity and the need for active conservation efforts. Engaging local schools and community groups could enhance awareness and help preserve avian diversity for future generations (Ali, 1980; BirdLife International, 2017).

5. Conclusion

The study of bird diversity in Narayanmali village reveals its ecological richness and importance as a critical habitat for both resident and migratory birds. The area's diverse environmental conditions, including its river, estuary, and mangrove ecosystems, support a wide variety of bird species. This highlights Narayan Mali’s role as a vital sanctuary for avian communities and underscores the need for effective conservation practices to maintain both local and regional biodiversity.

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