

Avifaunal diversity and Threat Assessment in the Dhamoi Pond Jhabua, India

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Abstract

The study highlights the significance of avifaunal diversity as an indicator of ecosystem health and underscores the ecological importance of Dhamoi Pond in Jhabua, India, as a habitat for diverse bird species. Conducted over 12 months (July 2022 to June 2023), the research employed point counts and line transects to document bird species, resulting in the identification of 30 species across 22 families, 14 orders, and 26 genera. This baseline data is crucial for future monitoring and conservation efforts, as it provides insights into the avian biodiversity of the area. The findings emphasize the role of Dhamoi Pond as a vital site for bird conservation, potentially supporting both resident and migratory species. Such studies are essential for understanding the ecological dynamics of the region and for implementing strategies to protect and sustain avian populations and their habitats.

Key words: Avifauna, Diversity, Dhamoi Pond, Jhabua, Narmada River, Satpura Range. **Introduction**

The present have a look at offers with the assessment of Avifaunal diversity in the Dhamoi Pond Jhabua, India. Jhabua district in the Indian state of Madhya Pradesh is known for its diverse landscapes, including forests, rivers, and agricultural fields, which provide habitats for a variety of bird species. The avifaunal diversity in Jhabua is influenced by its proximity to the Narmada River and the Satpura Range, which support a range of ecosystems. The Narmada River and its tributaries create ideal conditions for water birds and wetland species. The region has dry deciduous forests, which are home to many terrestrial and arboreal bird species. Farmlands and open fields attract carnivorous and insectivorous birds. Satpura Range and other hilly areas provide habitats for raptors and other cliff-nesting birds. Birds play a vital role in keeping balance of nature. Vulnerable to degradation and degeneration below the winning anthropogenic pressure are affected birds diversity (Gupta & Singh 2003). Richness, abundance and community composition of birds are often used by ecologists to understand the diversity of species in natural occurrence (Singh *et al.*, 2018)

Birds, often regarded as some of the most beautiful and fascinating creatures in nature, play a critical role in maintaining ecological balance and biodiversity. As vertebrates characterized by feathers, wings, and hollow bones—adaptations that enable their aerial lifestyle—birds are not only a source of aesthetic pleasure but also vital components of ecosystems worldwide. Activities of birds are considered as indicator of superiority of ecosystem and they also form the incurable links in many food chains, hence they imitate changes originating in several different ecosystem components (Custer & Osborne 1977) .Their vibrant colors, melodious calls, and easily identifiable traits make them among the most beloved animals. However, beyond their beauty and charm, birds hold immense ecological, economic, and cultural significance. Understanding bird diversity is essential for global conservation efforts, as it provides insights into the health of ecosystems, the impacts of environmental changes, and the measures needed to protect avian communities and their habitats. Many cities in India contain vast biodiversity of flora and fauna but due to rapid urbanization there has been an alarming reduction in biodiversity (Dapke et al., 2015).



Methodology

The study aimed to assess bird diversity and identify threats to avian populations in the study area. The methodology was designed to ensure systematic data collection, accurate bird identification, and comprehensive understanding of local perceptions regarding bird population decline. Below is a detailed description of the methodology employed:

1. Study Area and Vantage Points

Selection of Vantage Points: Six vantage points were selected for bird observation. These points were spaced 300 meters apart, as recommended by Huff et al. (2000), to ensure adequate coverage of the study area and minimize overlap in observations.

Initial Survey: The vantage points were determined during an initial survey conducted in August 2022 to identify optimal locations for bird observation.

Habitats Covered: The study area included diverse habitats, with particular attention given to areas near the outer edge of a pond, as these were expected to support higher bird diversity.

2. Bird Observation Protocol

Observation Period: Bird observations were conducted during two seasons: autumn (7–13 October 2022) and winter (1–8 January 2023). A total of 14 visits were made, with seven visits in each season.

Time of Observation: Observations were carried out during the morning (7:00–10:00 hr) and evening (16:00–18:00 hr) to coincide with peak bird activity periods.

Duration at Each Point: At each vantage point, 20 minutes were spent observing and recording bird species.

Equipment Used: Birds were observed using Olympus 7×35 binoculars to ensure accurate identification and recording.

3. Bird Identification

Field Guide: Bird identification was conducted using the field guide book Birds of India (Singh 2013), which provided detailed descriptions, illustrations, and distribution maps of bird species.

Taxonomic Expertise: A taxonomist was consulted to confirm the identification of species, particularly for challenging or rare sightings.

Systematic Nomenclature: The systematic nomenclature, classification, and status (resident or migratory) of birds were determined using Birds of India, a reputable checklist.

4. Questionnaire Survey

Target Respondents: A total of 60 respondents were interviewed, focusing on residents living near the outer edge of the pond, as they were likely to have firsthand knowledge of local bird populations and threats.

Survey Design: A semi-structured questionnaire was used to collect qualitative and quantitative data. The questionnaire included questions about observed changes in bird populations, perceived threats, and local conservation practices.

Survey Duration: The survey was conducted over three days during the winter season to ensure consistency in responses and minimize seasonal variability.

Local Perceptions: Respondents were asked about the possible causes of bird population decline in the area, including habitat loss, pollution, hunting, and climate change.

5. Data Analysis

Bird Diversity Data: Data from bird observations were compiled to calculate species richness, abundance, and diversity indices. The status of each species (resident or migratory) was recorded to understand seasonal variations in bird populations.

Threat Assessment: Responses from the questionnaire were analyzed to identify common themes and perceived threats to bird diversity. This information was used to prioritize conservation actions.

Statistical Tools: Basic statistical analysis was performed to summarize the data, including frequency distributions and descriptive statistics.



6. Ethical Considerations

Minimizing Disturbance: During bird observations, care was taken to minimize disturbance to the birds and their habitats. Observers maintained a safe distance and avoided loud noises or sudden movements.

Informed Consent: Respondents were informed about the purpose of the study and provided consent before participating in the questionnaire survey.

The methodology combined direct bird observations with community-based surveys to provide a comprehensive understanding of bird diversity and threats in the study area. By using standardized protocols, reliable identification tools, and engaging local residents, the study ensured robust data collection and meaningful insights for conservation planning. The integration of ecological and social data highlights the importance of community involvement in biodiversity conservation efforts.

Results and discussion

Wetlands, such as marshes, play a vital role in supporting bird populations by providing essential breeding, feeding, and resting habitats. However, these ecosystems are increasingly under pressure from human activities. This study aimed to document the diversity of bird species in Dhamoi Pond, Jhabua, India, and identify the primary threats to their survival. Using the point count method, six vantage points were established, each separated by 300 meters to ensure comprehensive coverage of the area. Observations were conducted from 2022 to 2023 using direct observation and call recording techniques.

A total of 50 individual birds were recorded, representing 30 species, 26 genera, 22 families, and 14 orders (as detailed in Table 1). The study revealed that recreational activities were among the most significant threats to bird populations in the area. Activities such as picnics, boating, and construction, particularly during the winter season, were observed to disturb bird habitats. The use of loudspeakers and other human-induced disturbances further exacerbated the problem. Notably, the main wetland area, which was heavily used for garbage dumping, picnics, and boating, showed very low species richness of wetland birds. In contrast, the less disturbed sections of the wetland hosted a higher diversity of bird species.

Local residents were also surveyed to understand their perceptions of the threats to bird populations. Half of the respondents identified recreational activities as the primary threat, while 14 households believed habitat loss was the main cause of decline. A smaller number of households cited pollution as a contributing factor, and 10 households reported no significant threats to bird populations in the area. Human disturbance was found to significantly affect the distribution of water birds, with the least disturbed areas supporting a greater diversity of species and nearly half of the total bird population.

The findings highlight the urgent need to minimize anthropogenic activities around the wetland to protect bird habitats. Recommendations include conducting a comprehensive survey across all seasons to develop a more complete checklist of bird species and implementing measures to reduce human disturbances, such as restricting recreational activities and managing waste disposal. By addressing these threats, it is possible to conserve the wetland ecosystem and ensure the survival of its avian inhabitants.

Ecological Significance of Birds

Pollination and Seed Dispersal

Birds are key agents in the pollination of flowers and the dispersal of seeds, contributing to the regeneration of forests and the maintenance of plant diversity. For example, hummingbirds, sunbirds, and honeyeaters are important pollinators for many flowering plants, while frugivorous birds like hornbills and toucans disperse seeds across vast distances, aiding in forest regeneration and plant propagation.

Integral Role in Food Chains and Food Webs

Birds occupy various trophic levels in food chains and food webs, acting as predators, prey, and scavengers. Raptors like eagles and hawks regulate populations of small mammals and other birds, while insectivorous birds such as warblers and flycatchers control insect populations, reducing the need for chemical pesticides. Scavengers like vultures play a crucial role in cleaning up carrion, preventing the spread of diseases.



Indicators of Ecosystem Health

Birds are often used as bio-indicators to assess the health of ecosystems. Changes in bird populations, diversity, and behavior can signal environmental disturbances such as habitat loss, pollution, climate change, and the introduction of invasive species. For instance, the decline of sensitive species like the Arctic tern or the California condor can indicate broader ecological imbalances.

Aesthetic and Ethical Values of Birds

Cultural and Aesthetic Importance

Birds have inspired human art, literature, music, and culture for centuries. Their vibrant plumage, intricate songs, and graceful flight have made them symbols of freedom, beauty, and peace. Bird watching, or birding, is a popular recreational activity that fosters a connection between humans and nature, promoting environmental awareness and conservation.

Ethical Responsibility for Conservation

As sentient beings, birds have an intrinsic right to exist and thrive. Ethical considerations demand that humans take responsibility for protecting bird species from extinction, especially when their decline is driven by anthropogenic activities such as deforestation, hunting, and climate change.

Threats to Bird Diversity

Habitat Loss and Fragmentation

The destruction of natural habitats due to urbanization, agriculture, and deforestation is the primary threat to bird populations. Wetlands, forests, and grasslands—critical habitats for many bird species—are being degraded or lost at an alarming rate.

Climate Change

Rising temperatures, shifting weather patterns, and extreme climatic events are altering the distribution and behavior of birds. Migratory species, in particular, face challenges as their breeding and wintering grounds become mismatched with optimal environmental conditions.

Pollution and Pesticides

Chemical pollutants, including pesticides like DDT and neonicotinoids, have devastating effects on bird populations. These chemicals can cause reproductive failures, weaken immune systems, and lead to direct mortality.

Invasive Species and Diseases

The introduction of non-native species, such as rats, cats, and invasive plants, disrupts ecosystems and threatens native bird populations. Additionally, diseases like avian malaria and West Nile virus pose significant risks, especially to island-endemic species with limited immunity.

Hunting and Illegal Trade

Unsustainable hunting and the illegal wildlife trade continue to threaten many bird species, particularly those with high economic or cultural value, such as parrots, raptors, and songbirds.

The Role of Bird Diversity Studies in Conservation

Monitoring and Assessment

Long-term studies on bird populations help scientists monitor trends in diversity, abundance, and distribution. Tools like bird surveys, citizen science initiatives (e.g., eBird), and satellite tracking provide valuable data for conservation planning.

Identifying Priority Areas for Conservation

By mapping bird diversity hotspots, researchers can identify critical habitats that require protection. For example, the identification of Important Bird and Biodiversity Areas (IBAs) has guided the establishment of protected areas worldwide.



Understanding Ecological Interactions

Studying bird behavior, diet, and habitat preferences helps elucidate their roles in ecosystems. This knowledge is essential for designing effective conservation strategies that address the needs of both birds and their habitats.

Raising Public Awareness

Research on bird diversity fosters public awareness about the importance of conservation. Educational programs, birdwatching events, and media campaigns can inspire communities to take action to protect birds and their habitats.

Conclusion

Birds are indispensable to the health and functioning of ecosystems, providing essential services such as pollination, seed dispersal, and pest control. Their intrinsic, aesthetic, and ethical values further underscore the need to conserve avian diversity. However, birds face numerous threats, including habitat loss, climate change, pollution, and invasive species. Studies on bird diversity are crucial for understanding these challenges and developing effective conservation strategies. By protecting birds, we not only preserve the beauty and wonder of nature but also safeguard the ecological balance that sustains life on Earth. As stewards of the planet, it is our responsibility to ensure that future generations can continue to enjoy the presence of these remarkable creatures.

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	Table-1: Checklist of birds recorded at the study area				
Oder	Family	Species	Scientific name		
Accipitriformes	Accipitridae	Himalayan griffon	Gyps himalayensis		
Anseriformes	Anatidae	Lesser whistling-duck	Dendrocygna javanica		
Anseriformes	Anatidae	Cotton pygmy-goose	Nettapus coromandelianu		
Bucerotiforme	Bucerotidae	Indian grey hornbil	Dicruridae		
Caprimulgiformes	Apodidae	White-rumped spinetail	Zoonavena sylvatica		
Charadriiformes	Scolopacidae	Common sandpiper	Actitis hypoleucos		
Ciconiiformes	Ciconiidae	Asian openbil	Anastomus oscitans		
Columbiformes	Columbidae	Western spotted dove	Stigmatopelia chinensis		
Columbiformes	Columbidae	Rock dove	Columba livia		
Columbiformes	Columbidae	Yellow-footed green-pigeon	Treron phoenicopterus		
Coraciiformes	Meropidae	Asian green bee-eater	Merops orientalis		

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Cuculiformes	Centropodidae	Greater couca	Centropus sinensis
Gruiformes	Rallidae	White-breasted waterhen	Amaurornis phoenicurus
Passeriforme	Oriolidae	Black-hooded oriole	Oriolus xanthornus
Passeriforme	Dicruridae	Ashy drongo	Dicrurus leucophaeus
Passeriforme	Dicruridae	White-bellied drong	Dicrurus caerulescen
Passeriforme	Parida	Great tit	Parus cinereus
Passeriforme	Cisticolidae	Common tailorbird	Orthotomus sutorius
Passeriforme	Phylloscopidae	Smoky warble	Phylloscopus fuligiventer
Passeriforme	Phylloscopidae	Tickell's leaf-warbler	Phylloscopus affinis
Passeriforme	Leiothrichidae	Jungle babbler	Argya striata
Passeriforme	Sturnidae	Jungle myna	Acridotheres fuscus
Passeriforme	Sturnidae	Common myna	Acridotheres tristis
Passeriforme	Muscicapidae	Common stonecha	Saxicola torquatus
Passeriforme	Muscicapidae	Pied bushchat	Saxicola caprata
Passeriforme	Muscicapidae	Grey bushchat	Saxicola ferreus
Passeriforme	Motacillidae	White wagtail	Motacilla alba
Pelecaniformes	Ardeidae	Indian pond-heron	Ardeola grayi
Piciformes	Picidae	White-naped woodpecker	Chrysocolaptes festivus
Suliformes	Phalacrocoracidae	Great cormorant	Phalacrocorax carbo