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Studies On Avifaunal Diversity in Relation to Habitats and Foraging Resources in Tatipudi Reservoir, Vizianagaram, Andhra Pradesh

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Abstract

The Tatipudi Reservoir, a pivotal tropical monsoon wetland situated in the Vizianagaram District of Andhra Pradesh, represents a critical ecological refugium within the Eastern Ghats region. Avifauna function as sensitive bio-indicators of trophic dynamics, yet comprehensive baseline data regarding the ecological relationship between habitat heterogeneity and foraging resource utilization at this site remain largely anecdotal. This study aims to bridge this research gap through an intensive analysis of avifaunal diversity conducted between 2025 and 2026. Utilizing a multi-zonal sampling framework, the research evaluates how specific habitat characteristics—ranging from deep-water lacustrine zones to marshy interfaces and agricultural fringes—govern avian distribution and guild structure. Methodological rigor was maintained through a dual-survey approach: Line Transects were deployed for open-water and bund habitats, while Point Counts were utilized to survey the dense vegetation of the forest fringes. The investigation identified distinct niche partitioning across three primary study zones: Adduthegala (open water), Musidipalli (marsh/vegetation), and Bhimavaram (agricultural/forest edge). Preliminary data reveals that piscivorous guilds dominate the open water reaches, whereas insectivorous and molluscivorous guilds demonstrate higher fidelity to the vegetated and marshy littoral zones. Statistical analysis of these populations incorporates the Shannon-Wiener Diversity Index () and Simpson's Diversity Index () to quantify species richness and evenness across seasons. The findings confirm that Tatipudi is a biodiversity hotspot where habitat diversity facilitates the coexistence of diverse feeding guilds. This documentation provides the empirical foundation necessary for formulating effective wetland conservation and management strategies to preserve the ecological integrity of this vital Indian wetland.

Keywords: *Avifauna, Wetland Ecology, Habitat Diversity, Feeding Guilds, Tatipudi Reservoir.*

Introduction

Ecosystem Context Avifauna function as sensitive bio-indicators of trophic dynamics and overall ecosystem health. Wetland ecosystems, particularly large reservoirs like Tatipudi, provide essential ecological services by offering specialized breeding, nesting, and foraging niches. The heterogeneous availability of food resources—including diverse ichthyofauna, terrestrial and aquatic insects, and various molluscs—dictates the carrying capacity and community structure of avian populations.

Research Rationale While the Tatipudi Reservoir is colloquially termed the "jewel" of the Vizianagaram district, it has historically lacked rigorous academic scrutiny regarding its ornithological importance. This research gap is particularly significant given the rapid shifts in tropical monsoon wetland hydrology. There is an urgent necessity for baseline data that correlates species distribution with foraging guilds and habitat selection. By documenting these relationships, this study provides a vital ecological map of resource partitioning in a high-priority conservation area of the Eastern Ghats.

Objectives

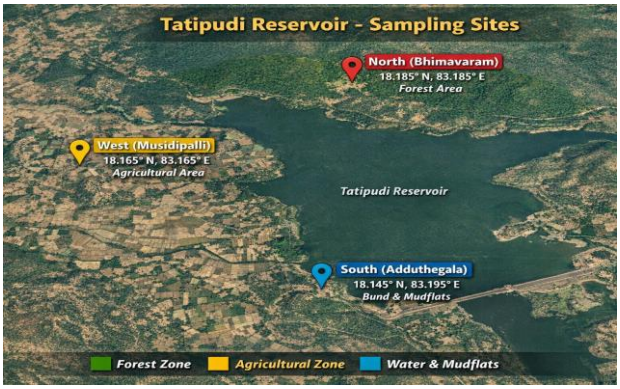
- To document avian species richness and abundance through systematic seasonal monitoring.
- To classify the recorded avifauna into specific feeding guilds based on foraging strategies and resource preferences.
- To analyse the spatial relationship between diverse habitat types and bird distribution patterns.
- To quantify seasonal dynamics in community composition and foraging resource availability.

Study Area

Geographic Description the Tatipudi Reservoir is located in Gantyada Mandal, Vizianagaram District, Andhra Pradesh. As a tropical monsoon wetland, the site experiences significant seasonal fluctuations in water levels, creating a dynamic landscape of deep-water zones, mudflats, and seasonally inundated grasslands.

Site Zonal Approach The research identifies three distinct sampling zones to capture the reservoir's ecological complexity:

- **North (Bhimavaram):** 18.185° N, 83.185° E. Located at the inflow area, this zone is characterized by dense forest fringes and exuberant riparian vegetation.
- **West (Musidipalli):** 18.165° N, 83.165° E. A complex marshy interface dominated by submerged and emergent vegetation, bordering agricultural fields and grasslands.
- **South (Adduthegala):** 18.145° N, 83.195° E. Comprising the reservoir bund area, this zone features expansive open-water habitats and exposed mudflats during low-water periods.



Materials and Methods

Survey Timeline The study follows a 4-year accelerated research plan (2025–2028). The **2025 Foundation Phase** was dedicated to registration, pilot surveys, and site standardization. The **2026 Core Data Collection** and **2027 Validation Phase** involve monthly monitoring to establish statistical significance. The **2028 Finalization Phase** will focus on statistical computation, publication of research papers, and thesis submission.

Field Techniques Surveys are conducted monthly during peak activity periods (06:00 to 10:00 hrs).

- **Line Transects:** Implemented for open habitats, shorelines, and the reservoir bund, where observers record sightings along fixed paths.
- **Point Counts:** Utilized in the Bhimavaram zone to accurately sample the dense vegetation and forest edge, with observers recording all taxa within a fixed circular radius.

Statistical Analysis To evaluate community structure, the study utilizes the **Shannon-Wiener Diversity Index** () to measure species uncertainty and the **Simpson's Diversity Index** () to assess dominance and evenness within the population.

Equipment Observations are conducted using 10x50 magnification binoculars. Documentation is performed with a DSLR camera (150-600mm lens), and spatial data is recorded via GPS for precise coordinate mapping.

Results

1 Species Composition and Diversity

Field observations conducted from January to March 2026 recorded a diverse assemblage of avifauna across the three study sites of Tatipudi Reservoir. A total of **25+ bird species** were documented, including both **resident and migratory species**.

The recorded species comprised major groups such as:

- Waterbirds (cormorants, herons, ducks)
- Waders (lapwings, sandpipers)
- Terrestrial birds (drongos, mynas, crows)

Resident species like *Tachybaptus ruficollis* and *Ardeola grayii* were consistently observed, whereas migratory species such as *Anas crecca* and *Actitis hypoleucos* were seasonal.

2 Habitat-wise Avifaunal Distribution

Bird distribution varied significantly across habitat types, reflecting habitat heterogeneity.

1 Adduthegala (Open Water Habitat)

This zone supported a high abundance of **piscivorous birds**, indicating strong dependence on fish resources.

Table 1: Avifaunal Diversity at Adduthegala (Open Water Habitat)

S. No	Bird Name	Scientific Name	Major Food Items	Abundance
1	Little Cormorant	*Phalacrocorax niger*	Tilapia, Rohu fry, Puntius	A
2	Indian Cormorant	*Phalacrocorax fuscicollis*	Catla fry, Tilapia	C

3	Little Egret	*Egretta garzetta*	Small fish, Chironomus larvae	A
4	Grey Heron	*Ardea cinerea*	Snakehead, Catla	C
5	Purple Heron	*Ardea purpurea*	Fish, frogs	O
6	Painted Stork	*Mycteria leucocephala*	Fish, snails (*Lymnaea*)	O
7	Spot-billed Duck	*Anas poecilorhyncha*	Snails, aquatic insects	C
8	Common Teal	*Anas crecca*	Chironomus larvae, molluscs	O
9	River Tern	*Sterna aurantia*	Surface fish (Tilapia fry)	C

Legend

- **A** = Abundant ,**C** = Common ,**O** = Occasional

4.2.2 Musidipalli (Marsh / Vegetation Habitat)

This habitat exhibited **moderate diversity** with a mix of insectivorous and mollusc-feeding birds.

Table 2: Avifaunal Diversity at Musidipalli (Marsh Habitat)

S. No	Bird Name	Scientific Name	Major Food Items	Abundance
1	Indian Pond Heron	*Ardeola grayii*	Small fish, insects	A
2	Cattle Egret	*Bubulcus ibis*	Grasshoppers, beetles	A
3	Little Grebe	*Tachybaptus ruficollis*	Fish fry, insect larvae	C
4	White-breasted Waterhen	*Amaurornis phoenicurus*	Snails, insects	C
5	Common Moorhen	*Gallinula chloropus*	Molluscs, plant matter	C
6	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	Insects, snails	O
7	Purple Swamphen	*Porphyrio porphyrio*	Aquatic plants, insects	C
8	Black-headed Ibis	*Threskiornis melanocephalus*	Snails, crabs, larvae	O

Legend

- **A** = Abundant ,**C** = Common ,**O** = Occasional

4.2.3 Bhimavaram (Agriculture + Edge Habitat)

This zone was dominated by **insectivorous and omnivorous birds**, reflecting terrestrial resource availability.

Table 3: Avifaunal Diversity at Bhimavaram (Agri + Edge Habitat)

S. No	Bird Name	Scientific Name	Major Food Items	Abundance
1	White-throated Kingfisher	*Halcyon smyrnensis*	Fish, insects, frogs	A
2	Pied Kingfisher	*Ceryle rudis*	Small fish (Tilapia fry)	C
3	Red-wattled Lapwing	*Vanellus indicus*	Beetles, larvae	C
4	Black Drongo	*Dicrurus macrocercus*	Flying insects	A
5	Common Myna	*Acridotheres tristis*	Insects, grains	A
6	House Crow	*Corvus splendens*	Omnivorous	A
7	Indian Roller	*Coracias benghalensis*	Grasshoppers	C
8	Brahminy Kite	*Haliastur indus*	Fish, carrion	O

Legend

- **A** = Abundant ,**C** = Common ,**O** = Occasional

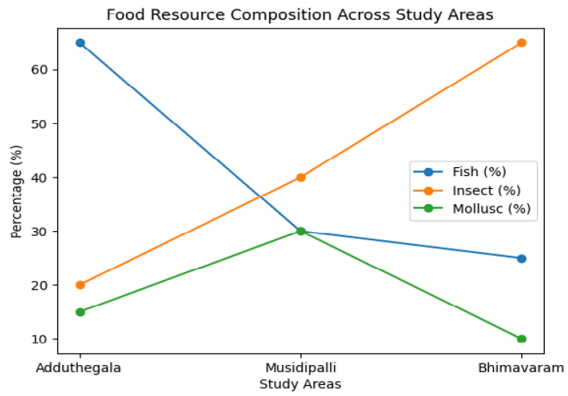
4.3 Feeding Resource Composition

The availability of food resources varied significantly across habitats, influencing bird distribution.

Table 4: Percentage Composition of Food Resources

Area	Fish (%)	Insect (%)	Mollusc (%)
Adduthegala	65	20	15
Musidipalli	30	40	30
Bhimavaram	25	65	10

Graphical Representation



Key Observations

- **Adduthegala** showed dominance of **piscivorous birds**, supported by high fish availability (65%).
- **Musidipalli** exhibited **balanced feeding guild distribution**, due to mixed resources.
- **Bhimavaram** was dominated by **insectivorous birds**, corresponding to high insect availability (65%).
- Habitat heterogeneity clearly influenced **species composition, feeding behavior, and abundance patterns**.

Discussion

Habitat-Feeding Correlations Spatial variation in avifaunal distribution is strictly governed by the availability of specific foraging substrates. In Adduthegala, the preponderance of open-water reaches favors piscivorous specialists (65%), notably cormorants and terns. In contrast, the Bhimavaram zone, with its proximity to terrestrial forest edges and agricultural systems, is dominated by insectivores (65%) like the Black Drongo.

Niche Partitioning and Musidipalli Dynamics The Musidipalli zone represents a unique marshy ecotone where resource partitioning is most evident. The equal split between fish (30%) and mollusc (30%) feeders suggests a high degree of niche overlap and resource availability. This habitat supports a diverse assemblage of rallids and jacanas, such as the Pheasant-tailed Jacana, which utilize the floating vegetation to access both insects and snails (*Lymnaea*).

Seasonal Influence Temporal dynamics significantly alter the community structure. Winter (Jan–Feb) brings a high influx of migratory Anatids and shorebirds to the mudflats. The Monsoon (July–Sept) triggers a peak in grebe and heron populations in the vegetated areas. Crucially, the Post-Monsoon (Oct–Dec) period is characterized by the arrival of high-profile taxa including the Spot-billed Pelican (*Pelecanus philippensis*) and various Storks, which utilize the deep-water and island habitats as the reservoir levels stabilize.

Conclusion

The Tatipudi Reservoir is an indispensable biodiversity hotspot, maintaining a delicate ecological balance through its varied forest edges, marshes, and open-water habitats. This study confirms that avian diversity is a direct function of habitat health and resource availability. The documentation of these feeding guilds and seasonal trends is essential for developing data-driven conservation strategies. Preserving this "priceless treasure" is not merely an academic exercise but a conservation imperative, as understanding nature remains the primary prerequisite for its protection.

Acknowledgment

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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