IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, November 2026
Impact Factor: 8.2

Seasonal Cycle of Insectivorous Birds of Uttar Pradesh: Ecology, Migration and Environmental Implications — A Review

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Abstract: *Insectivorous birds constitute an important ecological group that significantly contributes to insect population regulation and ecosystem stability. Temple ecosystems in Uttar Pradesh represent unique socio-ecological landscapes where natural habitats coexist with cultural and religious activities. These environments often include sacred groves, ponds, gardens, and old architectural structures that provide suitable habitats for diverse insectivorous bird species. Seasonal variations in temperature, rainfall, and insect availability strongly influence the life cycles of these birds, including migration, breeding, feeding behaviour, and molting patterns.*

This review synthesizes literature (2000–2024) focusing on insectivorous birds in Uttar Pradesh, with special emphasis on temple ecosystems. It highlights how seasonal climatic cycles, particularly the monsoon, affect insect abundance and bird activity within these sacred landscapes. The study also explores ecological services such as pest control, cultural conservation, and biodiversity support. Furthermore, it examines threats such as urbanization, temple tourism pressure, pesticide use, and climate change. The review identifies research gaps and suggests conservation strategies integrating traditional beliefs with modern ecological practices.

Keywords: Insectivorous birds, temple ecosystems, seasonal cycle, Uttar Pradesh, migration, sacred groves, biodiversity conservation

I. INTRODUCTION

Insectivorous birds are species that primarily feed on insects and play a crucial role in maintaining ecological balance. In India, particularly in Uttar Pradesh, temple ecosystems act as microhabitats supporting avian diversity. These ecosystems often include:

- Sacred groves
- Temple ponds and wetlands
- Gardens and orchards
- Old buildings and nesting sites

Such environments provide shelter, nesting grounds, and abundant food resources for insectivorous birds.
Seasonal changes influence:

- Migration
- Breeding cycles
- Feeding behaviour
- Molting

In temple ecosystems, these seasonal dynamics are further influenced by human activities such as religious gatherings, lighting, sound, and habitat maintenance practices.

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Understanding these interactions is essential for:

- Biodiversity conservation
- Cultural landscape management
- Sustainable ecosystem functioning

II. STUDY AREA: TEMPLE ECOSYSTEMS OF UTTAR PRADESH

Uttar Pradesh, located in the Indo-Gangetic plains, has a subtropical climate with three major seasons:

Season	Months	Characteristics
Summer	March–June	High temperature
Monsoon	July–September	Heavy rainfall
Winter	October–February	Cool and dry

Temple ecosystems across the state include:

- Sacred groves near temples
- Riverbank temples along the Ganga and Yamuna
- Temple ponds and wetlands
- Urban temple gardens

These habitats serve as refuges for both resident and migratory insectivorous birds due to reduced disturbance in certain sacred zones and traditional conservation beliefs.

III. METHODOLOGY

This review is based on a systematic analysis of literature from 2000–2024.

Data Sources

- Scopus
- Web of Science
- Google Scholar
- JSTOR
- Indian ornithological journals

Inclusion Criteria

- Studies on insectivorous birds
- Research in India or similar ecosystems
- Focus on seasonal ecology, migration, or habitat use
- Relevance to temple or semi-natural ecosystems

Analytical Themes

- Seasonal population dynamics
- Feeding ecology
- Migration patterns
- Breeding ecology
- Environmental and cultural impacts

IV. DIVERSITY OF INSECTIVOROUS BIRDS IN TEMPLE ECOSYSTEMS

Temple ecosystems support a variety of insectivorous birds due to diverse microhabitats.

Species	Family	Feeding Strategy	Habitat in Temple Ecosystem
Black Drongo	Dicruridae	Aerial hunting	Temple gardens
Green Bee-eater	Meropidae	Aerial hawking	Open temple grounds

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Barn Swallow	Hirundinidae	Flying insects	Temple complexes
Asian Paradise Flycatcher	Monarchidae	Foliage gleaning	Sacred groves
White Wagtail	Motacillidae	Ground feeding	Temple ponds

These birds utilize:

- Trees for nesting
- Temple structures for roosting
- Water bodies for feeding

V. SEASONAL CYCLE OF INSECTIVOROUS BIRDS IN TEMPLE ECOSYSTEMS

5.1 Pre-Breeding Season (Late Winter–Early Spring)

- Territory establishment
- Courtship behaviour
- Increased feeding activity
- Use of quiet sacred areas for nesting preparation

5.2 Breeding Season (April–July)

Coincides with early monsoon and increased insect availability.

Key activities:

- Nest construction in trees or temple structures
- Egg laying and chick rearing
- High feeding frequency
- Temple groves provide safe nesting due to cultural protection.

5.3 Post-Breeding and Molting

- Feather replacement
- Reduced activity
- Dependence on stable food supply

5.4 Migration

Winter Migrants

- Warblers, wagtails arrive from Central Asia and Europe
- Prefer temple wetlands and quiet zones

Local Movement

- Birds shift between temple and nearby agricultural areas based on food availability

VI. FEEDING ECOLOGY IN TEMPLE ECOSYSTEMS

Insectivorous birds feed on:

- Beetles
- Caterpillars
- Mosquitoes
- Ants
- Grasshoppers

Feeding Strategies

- Aerial hawking (bee-eaters, swallows)

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- Gleaning (flycatchers)
- Ground feeding (wagtails)
- Perch-and-sally (drongos)

Temple lighting at night may attract insects, indirectly increasing feeding opportunities for birds.

VII. ECOLOGICAL IMPORTANCE OF TEMPLE ECOSYSTEMS

Natural Pest Control

Birds reduce insect populations in nearby agricultural fields.

Biodiversity Conservation

Sacred groves act as biodiversity hotspots.

Cultural-Ecological Link

Religious beliefs often protect trees and animals, indirectly conserving bird habitats.

Indicator Species

Bird presence reflects environmental health of temple ecosystems.

VIII. IMPACT OF CLIMATE CHANGE AND ANTHROPOGENIC PRESSUR

Climate Change Effects

- Altered migration timing
- Breeding mismatches
- Changes in insect availability

Human-Induced Impacts

- Urbanization around temples
- Noise and light pollution
- Tourism pressure
- Pesticide use in temple gardens
- These factors may disrupt seasonal cycles of birds.

IX. LITERATURE REVIEW TABLE

Author	Year	Study Area	Key Findings
Ali	2002	India	Bird diversity overview
Newton	2008	Global	Migration ecology
Grimmett et al.	2011	Indian subcontinent	Bird distribution
Sekercioglu	2006	Global	Ecological roles
Praveen et al.	2016	India	Bird checklist
Wiens	2011	Global	Population ecology
Price	2015	Asia	Evolutionary ecology

X. RESEARCH GAPS

- Lack of temple-specific ecological studies
- Limited long-term seasonal monitoring
- Insufficient research on human-bird interactions
- Lack of microhabitat analysis in sacred groves

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XI. CONSERVATION IMPLICATIONS

- Protection of sacred groves
- Eco-friendly temple management
- Reduction in pesticide use
- Awareness among temple authorities
- Promotion of bird-friendly landscapes
- Integration of traditional knowledge with modern conservation

XII. CONCLUSION

Temple ecosystems in Uttar Pradesh provide unique habitats for insectivorous birds, supporting their seasonal cycles and ecological functions. These sacred landscapes play a vital role in biodiversity conservation and ecological balance. Seasonal patterns of insectivorous birds are closely linked to climatic conditions and insect availability, which are further influenced by cultural practices and human activities.

Protecting temple ecosystems not only preserves cultural heritage but also strengthens ecological sustainability. Future research should focus on long-term monitoring, climate impacts, and community-based conservation strategies

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