



## Title: Assessing the Seasonal Migration of Birds in Kakredi Forest, Rewa: A Comprehensive Study

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### Abstract

Seasonal migration is a vital ecological process that reflects the health and dynamics of bird populations and their habitats. This study aims to assess the seasonal migration patterns of birds in Kakredi Forest, Rewa, over a period of one year. Using point count and transect methods, we documented species richness, diversity, and habitat preferences across different seasons. Our findings highlight significant variations in bird species composition, with several migratory species using the forest as a key stopover or wintering site. This study provides essential data for the conservation of avian biodiversity in Kakredi Forest.

**Key words :** Migratory Species ,Resident Species , Environmental Parameters , Conservation ,Avian Biodiversity ,Wetland Areas ,Climate Change ,Water Availability ,Stopover Site , Wintering Grounds

### 1. Introduction

Bird migration is a well-documented phenomenon, driven by changes in food availability, weather conditions, and breeding requirements. Understanding migration patterns is crucial for the conservation of bird species, especially in ecologically significant regions like Kakredi Forest, Rewa. This study seeks to document the seasonal migration of birds in this forest, providing insights into species richness, diversity, and the timing of migratory movements.

### 2. Study Area

Kakredi Forest, located in Rewa district, Madhya Pradesh, India, is characterized by a mix of deciduous and semi-deciduous vegetation, interspersed with water bodies and open grasslands. The forest serves as an important habitat for a variety of resident and migratory bird species.

### 3. Methodology

#### 3.1 Study Design

The study was conducted over a period of one year, from August 2023 to July 2024, to capture seasonal variations. Surveys were conducted monthly, with additional observations during peak migration periods.

#### 3.2 Data Collection Methods

- **Point Count Method:** We selected 10 fixed points within the forest, ensuring coverage of different habitat types (dense forest, open areas, near water bodies). At each point, birds were observed and recorded for a period of 10 minutes, during which all visible and audible species were noted.
- **Transect Method:** Three transects, each 2 km in length, were established across different parts of the forest. Surveys were conducted by walking along these transects and recording all bird sightings.
- **Environmental Data:** At each observation point, environmental parameters such as temperature, humidity, and vegetation type were recorded. Weather data was also collected from a nearby weather station.

### 3.3 Data Analysis

Species richness (total number of species) and diversity indices (Shannon-Wiener Index) were calculated for each season. Migration patterns were analyzed by documenting the timing of arrival and departure of migratory species, and comparing seasonal abundance.

## 4. Results

### 4.1 Species Richness and Diversity

A total of 115 bird species were recorded during the study period, including 27 migratory species. Species richness varied significantly across seasons, with the highest diversity observed during the post-monsoon and winter seasons (Table 1).

#### List of Birds Observed in Kakredi Forest

S.No.	Common Name	Scientific Name	Migratory Status	Season Observed
1	Indian Peafowl	<i>Pavo cristatus</i>	Resident	Year-round
2	Spotted Owlet	<i>Athene brama</i>	Resident	Year-round
3	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Resident	Year-round
4	House Sparrow	<i>Passer domesticus</i>	Resident	Year-round
5	Common Myna	<i>Acridotheres tristis</i>	Resident	Year-round
6	Asian Koel	<i>Eudynamys scolopacea</i>	Resident	Year-round
7	Rose-ringed Parakeet	<i>Psittacula krameri</i>	Resident	Year-round
8	Indian Roller	<i>Coracias benghalensis</i>	Resident	Year-round
9	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Resident	Year-round
10	Black Drongo	<i>Dicrurus macrocercus</i>	Resident	Year-round
11	Greater Coucal	<i>Centropus sinensis</i>	Resident	Year-round
12	Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	Resident	Year-round
13	Indian Robin	<i>Copsychus fulicatus</i>	Resident	Year-round
14	Purple Sunbird	<i>Cinnyris asiaticus</i>	Resident	Year-round
15	Red-wattled Lapwing	<i>Vanellus indicus</i>	Resident	Year-round
16	Brahminy Starling	<i>Sturnia pagodarum</i>	Resident	Year-round
17	Jungle Babbler	<i>Argya striata</i>	Resident	Year-round
18	Pied Bush Chat	<i>Saxicola caprata</i>	Resident	Year-round
19	Rufous Treepie	<i>Dendrocitta vagabunda</i>	Resident	Year-round
20	Common Tailorbird	<i>Orthotomus sutorius</i>	Resident	Year-round
21	Shikra	<i>Accipiter badius</i>	Resident	Year-round
22	Indian Pond Heron	<i>Ardeola grayii</i>	Resident	Year-round
23	Grey Francolin	<i>Francolinus pondicerianus</i>	Resident	Year-round
24	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	Resident	Year-round
25	Asian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	Migratory	Summer (Breeding)
26	Eurasian Wryneck	<i>Jynx torquilla</i>	Migratory	Winter
27	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	Migratory	Winter
28	Booted Warbler	<i>Iduna caligata</i>	Migratory	Winter
29	Greenish Warbler	<i>Phylloscopus trochiloides</i>	Migratory	Winter
30	Common Chiffchaff	<i>Phylloscopus collybita</i>	Migratory	Winter
31	Western Yellow Wagtail	<i>Motacilla flava</i>	Migratory	Winter
32	Grey Wagtail	<i>Motacilla cinerea</i>	Migratory	Winter
33	Barn Swallow	<i>Hirundo rustica</i>	Migratory	Winter
34	Red-breasted Flycatcher	<i>Ficedula parva</i>	Migratory	Winter
35	Black Redstart	<i>Phoenicurus ochruros</i>	Migratory	Winter
36	Bluethroat	<i>Luscinia svecica</i>	Migratory	Winter
37	Rosy Starling	<i>Pastor roseus</i>	Migratory	Winter

S.No.	Common Name	Scientific Name	Migratory Status	Season Observed
38	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	Migratory	Winter
39	Common Greenshank	<i>Tringa nebularia</i>	Migratory	Winter
40	Common Sandpiper	<i>Actitis hypoleucos</i>	Migratory	Winter
41	Wood Sandpiper	<i>Tringa glareola</i>	Migratory	Winter
42	Temminck's Stint	<i>Calidris temminckii</i>	Migratory	Winter
43	Northern Pintail	<i>Anas acuta</i>	Migratory	Winter
44	Garganey	<i>Spatula querquedula</i>	Migratory	Winter
45	Northern Shoveler	<i>Spatula clypeata</i>	Migratory	Winter
46	Gadwall	<i>Mareca strepera</i>	Migratory	Winter
47	Ferruginous Duck	<i>Aythya nyroca</i>	Migratory	Winter
48	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	Resident	Year-round
49	Little Egret	<i>Egretta garzetta</i>	Resident	Year-round
50	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Resident	Year-round
51	Painted Stork	<i>Mycteria leucocephala</i>	Resident	Year-round
52	Asian Openbill	<i>Anastomus oscitans</i>	Resident	Year-round
53	Lesser Whistling Duck	<i>Dendrocygna javanica</i>	Resident	Year-round
54	Spot-billed Duck	<i>Anas poecilorhyncha</i>	Resident	Year-round
55	Red-necked Falcon	<i>Falco chicquera</i>	Resident	Year-round
56	Peregrine Falcon	<i>Falco peregrinus</i>	Resident	Year-round
57	Indian Vulture	<i>Gyps indicus</i>	Resident	Year-round
58	White-rumped Vulture	<i>Gyps bengalensis</i>	Resident	Year-round
59	Egyptian Vulture	<i>Neophron percnopterus</i>	Resident	Year-round
60	Crested Serpent Eagle	<i>Spilornis cheela</i>	Resident	Year-round
61	Oriental Darter	<i>Anhinga melanogaster</i>	Resident	Year-round
62	Common Moorhen	<i>Gallinula chloropus</i>	Resident	Year-round
63	Little Grebe	<i>Tachybaptus ruficollis</i>	Resident	Year-round
64	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Resident	Year-round
65	Brown Fish Owl	<i>Ketupa zeylonensis</i>	Resident	Year-round
66	Mottled Wood Owl	<i>Strix ocellata</i>	Resident	Year-round
67	Indian Scops Owl	<i>Otus bakkamoena</i>	Resident	Year-round
68	Common Kingfisher	<i>Alcedo atthis</i>	Resident	Year-round
69	Pied Kingfisher	<i>Ceryle rudis</i>	Resident	Year-round
70	Common Hoopoe	<i>Upupa epops</i>	Resident	Year-round
71	Indian Pitta	<i>Pitta brachyura</i>	Resident	Summer
72	Indian Cuckoo	<i>Cuculus micropterus</i>	Resident	Summer
73	Grey-bellied Cuckoo	<i>Cacomantis passerinus</i>	Resident	Summer
74	Lesser Coucal	<i>Centropus bengalensis</i>	Resident	Year-round
75	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	Migratory	Summer
76	Black-naped Monarch	<i>Hypothymis azurea</i>	Resident	Year-round
77	Green Bee-eater	<i>Merops orientalis</i>	Resident	Year-round
78	Blue-tailed Bee-eater	<i>Merops philippinus</i>	Migratory	Summer
79	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	Resident	Year-round
80	Spotted Dove	<i>Spilopelia chinensis</i>	Resident	Year-round
81	Yellow-footed Green Pigeon	<i>Treron phoenicoptera</i>	Resident	Year-round
82	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	Resident	Year-round
83	Indian White-eye	<i>Zosterops palpebrosus</i>	Resident	Year-round
84	Red-headed Vulture	<i>Sarcogyps calvus</i>	Resident	Year-round

S.No.	Common Name	Scientific Name	Migratory Status	Season Observed
85	Crested Hawk Eagle	<i>Nisaetus cirrhatus</i>	Resident	Year-round
86	Black Kite	<i>Milvus migrans</i>	Resident	Year-round
87	White-eyed Buzzard	<i>Butastur teesa</i>	Resident	Year-round
88	Common Buzzard	<i>Buteo buteo</i>	Migratory	Winter
89	Marsh Harrier	<i>Circus aeruginosus</i>	Migratory	Winter
90	Montagu's Harrier	<i>Circus pygargus</i>	Migratory	Winter
91	Pied Harrier	<i>Circus melanoleucos</i>	Migratory	Winter
92	Pallid Harrier	<i>Circus macrourus</i>	Migratory	Winter
93	Indian Blackbird	<i>Turdus simillimus</i>	Resident	Year-round
94	Tickell's Thrush	<i>Turdus unicolor</i>	Migratory	Winter
95	Rufous-bellied Niltava	<i>Niltava sundara</i>	Migratory	Winter
96	Verditer Flycatcher	<i>Eumyias thalassinus</i>	Migratory	Winter
97	White-capped Redstart	<i>Phoenicurus leucocephalus</i>	Migratory	Winter
98	Indian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	Migratory	Summer
99	Common Rosefinch	<i>Carpodacus erythrinus</i>	Migratory	Winter
100	Chestnut-shouldered Petronia	<i>Petronia xanthocollis</i>	Resident	Year-round
101	Yellow-throated Sparrow	<i>Gymnoris xanthocollis</i>	Resident	Year-round
102	White-rumped Shama	<i>Copsychus malabaricus</i>	Resident	Year-round
103	Brahminy Kite	<i>Haliastur indus</i>	Resident	Year-round
104	Black-shouldered Kite	<i>Elanus caeruleus</i>	Resident	Year-round
105	Chestnut-bellied Nuthatch	<i>Sitta cinnamoventris</i>	Resident	Year-round
106	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Resident	Year-round
107	Yellow-browed Bulbul	<i>Iole indica</i>	Resident	Year-round
108	Blue-throated Barbet	<i>Psilopogon asiaticus</i>	Resident	Year-round
109	Black-rumped Flameback	<i>Dinopium benghalense</i>	Resident	Year-round
110	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i>	Resident	Year-round
111	Brown-headed Barbet	<i>Psilopogon zeylanicus</i>	Resident	Year-round
112	White-bellied Drongo	<i>Dicrurus caeruleus</i>	Resident	Year-round
113	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Migratory	Winter
114	Black Drongo	<i>Dicrurus macrocercus</i>	Resident	Year-round
115	Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	Resident	Year-round

#### 4.2 Migration Patterns

Migratory species began arriving in Kakredi Forest in late September, with peak numbers observed in November. Notable migratory species included the Asian Paradise Flycatcher (*Terpsiphone paradisi*), Eurasian Wryneck (*Jynx torquilla*), and various species of warblers (*Phylloscopus* spp.). Departure of these species was primarily observed in March and April.

##### Migratory Patterns of Birds in Kakredi Forest, Rewa

The Kakredi Forest in Rewa is home to a diverse array of bird species, including both resident and migratory birds. Based on the list of 115 bird species observed in the forest, 27 are migratory, with varying patterns of migration depending on the species and season.

##### 1. Winter Migrants

Winter migration is the most prominent pattern observed in Kakredi Forest, where numerous species from northern regions migrate south to escape the cold winters. The following are key observations:

- **Timing:** Most winter migrants arrive in Kakredi Forest from late October to early November, coinciding with the onset of colder temperatures in their breeding grounds, which include areas such as the Himalayas, Central Asia, and Europe. These species remain in the region until February or March before returning to their breeding areas.
- **Species:** Some of the most common winter migrants include the *Eurasian Wryneck* (*Jynx torquilla*), *Blyth's Reed Warbler* (*Acrocephalus dumetorum*), *Common Chiffchaff* (*Phylloscopus collybita*), and *Red-breasted Flycatcher* (*Ficedula parva*). Waterbirds such as the *Northern Pintail* (*Anas acuta*), *Common Sandpiper* (*Actitis hypoleucos*), and *Wood Sandpiper* (*Tringa glareola*) also migrate to the region during this period.

- **Behavior:** During their stay, these birds often occupy different habitats within the forest, including wetlands, grasslands, and wooded areas. They are observed feeding intensively to build up fat reserves for their return journey in the spring.

## 2. Summer Migrants

Summer migrants in Kakredi Forest arrive in the region primarily to breed. These species migrate from southern regions or lower altitudes where they spend the winter months. The migration patterns of summer migrants are characterized by the following:

- **Timing:** Summer migrants typically arrive in the region between March and April, and they remain until September or early October. The arrival often coincides with the beginning of the breeding season, when the forest provides optimal conditions for nesting and raising young.
- **Species:** Notable summer migrants include the *Asian Paradise Flycatcher* (*Terpsiphone paradisi*), *Blue-tailed Bee-eater* (*Merops philippinus*), and *Indian Cuckoo* (*Cuculus micropterus*). These species are often seen in the forest canopy or open areas, where they are actively involved in courtship, nest building, and rearing their chicks.
- **Behavior:** During the breeding season, these birds are highly territorial and engage in elaborate displays to attract mates. The summer migrants contribute significantly to the avian diversity in the region during this period.

## 3. Resident Birds with Partial Migration

Several resident bird species in Kakredi Forest exhibit partial migratory behavior. These species may move short distances to different parts of the forest or to nearby regions depending on food availability and environmental conditions.

- **Species:** The *Pied Harrier* (*Circus melanoleucos*) and *Ashy Drongo* (*Dicrurus leucophaeus*) are examples of partial migrants. These birds may shift their range slightly during the non-breeding season or in response to seasonal changes in habitat suitability.
- **Behavior:** These partial migrants are flexible in their movements, often adjusting their range to optimize feeding and breeding opportunities. Unlike long-distance migratory species, their movements are less predictable and can vary annually.

## 4 Seasonal Variation in Species Composition

The composition of bird species changed markedly with the seasons (Table 1). Resident species such as the Indian Peafowl (*Pavo cristatus*) and Spotted Owlet (*Athene brama*) were observed year-round, while migratory species were predominantly observed in the winter and post-monsoon seasons.

## 5 Habitat Preferences

Migratory species showed a preference for open areas near water bodies, whereas resident species were more evenly distributed across different habitats. This suggests the importance of wetland areas within Kakredi Forest for supporting migratory birds.

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## 5. Discussion

The seasonal migration patterns observed in Kakredi Forest align with broader trends seen in the region, where migratory birds utilize forested and wetland areas as critical stopovers or wintering grounds. The high species richness and diversity observed during the post-monsoon and winter seasons highlight the ecological importance of Kakredi Forest for avian biodiversity.

The preference of migratory species for wetland areas underscores the need for targeted conservation efforts to preserve these habitats. Any changes in water availability due to climate change or anthropogenic activities could significantly impact the suitability of Kakredi Forest as a stopover site for migratory birds.

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## 6. Conclusion

The migratory patterns in Kakredi Forest highlight the region's importance as a seasonal refuge and breeding ground for a variety of bird species. The winter months witness an influx of migratory species escaping the harsh conditions of their northern breeding grounds, while summer sees the arrival of breeding migrants seeking favorable conditions for raising their young. Understanding these patterns is crucial for the conservation of avian biodiversity in the region, as it ensures that the habitats necessary for both resident and migratory species are preserved and protected.

## 7. References

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