

## **Bird Diversity of Kamlang Wildlife Sanctuary and its adjacent areas: A preliminary survey**

**Talo Biju<sup>1</sup>, Apoli Misaya<sup>1</sup>, Gunjan Kumar Saurav<sup>1</sup> and Daniel Mize<sup>1\*</sup>**

<sup>1</sup>Ecology and Wildlife Biology Unit, Department of Zoology, Rajiv Gandhi University,  
Arunachal Pradesh Papum Pare - 791112 (India)

\* (Corresponding Author) Email id: [mizezoology@yahoo.ac.in](mailto:mizezoology@yahoo.ac.in)

### **Abstract**

Kamlang Wildlife Sanctuary (KWS) is a protected area that falls within the Himalayan Biogeographical Zone in Arunachal Pradesh, India. It has a great diversity of flora and fauna, which constitutes an important element in the conservation of the biodiversity of the region. A trail survey was conducted from January, 2019 to December, 2020 where a permanent trail from KWS range office to Glow Lake covering nearly 20km was surveyed two times and all the birds observed were recorded. The Shannon-Weiner diversity index was used to calculate species diversity richness. A total of 68 species belonging to 28 families were identified, with the highest 75% belonging to the Passeriformes order, followed by Accipitriformes with 10% representation of the total avian diversity. The richness value was found to be 3.668, with an evenness value of 0.5763. The results of this study underscore the importance of KWS as an important habitat for birds and highlight the need for conservation efforts to ensure the continued presence of these species in the sanctuary. The survey provides baseline data on the species composition of the sanctuary and serves as a reference for future research and conservation efforts. Further surveys are needed to determine the detailed species composition of bird in the sanctuary.

**Key words :** Bird Diversity, Kamlang Wildlife Sanctuary, Conservation, Species richness.

**B**ird populations, characterized by their species composition, abundance, richness, diversity, rarity, and endemism, are frequently used to evaluate ornithological features and assign conservation value to specific sites<sup>5</sup>. Due to their ecological role and recreational value, birds are a significant resource in forest ecosystems, and their number and diversity are

crucial components of the ecology. India has over 1300 known bird species, with Arunachal Pradesh alone hosting 800 species. Of these 800, 47 species are classified in various threatened categories by the IUCN Red Data List, including 11 critically endangered, 10 endangered, 26 vulnerable, and 33 near threatened species<sup>9</sup>. Despite this rich bird population, until the late 1980s, the state did not receive many visits from biologists and researchers exploring the far-flung areas of the region.

Singh's<sup>13</sup> review revealed the remarkable biodiversity potential of Arunachal Pradesh, with 519 species reported for the state despite limited surveys in many areas. The region gained scientific prominence with the discovery of a new bird species, the Bugun Liocichla (*Liocichla bugunorum*), in western Arunachal near Eaglenest Wildlife Sanctuary in<sup>1</sup>. This discovery has attracted the attention of numerous ornithologists, wildlife biologists, and conservationists to the area. Despite the abundance of wildlife in KWS, the region has remained relatively unexplored due to its

inaccessibility. However, a number of subsequent surveys conducted by Katti *et al.*<sup>10</sup>, Rao and Chowla<sup>11</sup>, Das *et al.*<sup>6</sup>, and Borah *et al.*<sup>4</sup> have revealed the remarkable diversity of fauna present in this area. Unfortunately, most of these surveys were conducted in conjunction with Namdapha National Park, making it difficult to obtain a clear picture of the fauna exclusive to KWS. Moreover, there has been no proper ornithological study of this region, resulting in a limited report available for review. To fill this gap in knowledge, this study aims to determine the distribution and presence of bird species in KWS and its adjacent areas, and collect baseline data on bird populations that can be used to assess changes over time, plan conservation efforts, and inform management decisions.

*Study area :*

Kamlang Wildlife Sanctuary (KWS) is a protected area located at 27° 38' 30" N and 96° 37' 45" E coordinates (Figure 1). It comes under the Himalayan biogeographic zone. It covers an area of 783 km<sup>2</sup> and it is a

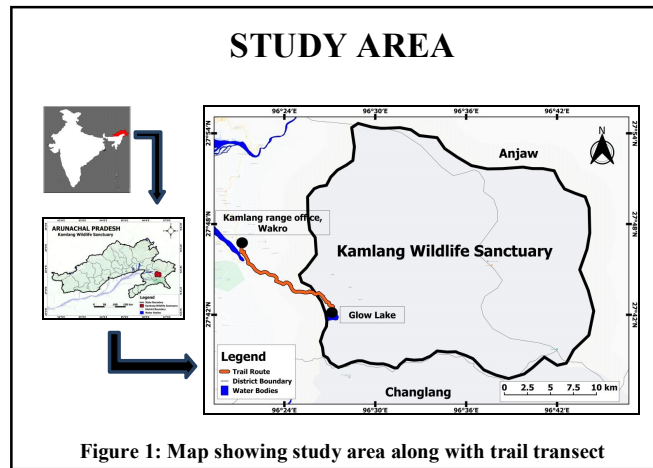


Figure 1: Map showing study area along with trail transect

part of the larger Kamlang Reserve Forest. The sanctuary was established in 1889 and was declared a Tiger reserve in 2018, making it the 50th Tiger reserve in India. It is also one of the Important Bird Areas (IBA) with site code: IN-AR-29.

The average temperature in this region ranges from 12° to 39°C, with the lowest temperature reaching subzero and the highest reaching 32°C. The area falls in a heavy rainfall belt and has an average annual rainfall of 2,500–3,500 mm. The entire area is mountainous with elevation ranging from 300 to 6000 meter, and it is drained by the tributaries of the Lohit River. The largest lake in Kamlang, WLS, is Glow. The sanctuary is home to various flora and fauna, including tigers, leopards, barking deer, capped langurs, Hoolock gibbons, Himalayan black bears, and many species of birds. Recently the Critically Endangered white-bellied heron (*Ardea insignis*) has also been reported from KWS. The vegetation and habitat of the sanctuary consist of Tropical Wet Evergreen Forest, Sub-tropical Broadleaf, Coniferous Forest, Montane Wet Temperate Forest, and Sub-alpine Dry Scrub.

In order to find out bird diversity, trail surveys<sup>3</sup> were conducted two times over the course of eight months (2019-20) from the Kamlang range office to Glow Lake, covering a distance of roughly 20km. The survey was conducted once in the months of January and October. The data was collected between 05300hrs morning to 16300hrs evening. In the monsoon, it was impossible to walk on the trail because it was mostly covered with dense forest. Therefore, all the bird was recorded by two researchers, accompanied by two forest guard surveying each side of the trail.

Additionally, the adjacent areas were also surveyed to record bird diversity. Nikon 5300 DSLR camera mounted with a 300mm lens was used for photographic evidence. For the identification of birds, a field guide by Grimmett, Inskipp and Inskipp<sup>8</sup> was used, and for classification International Ornithological Congress (Ver.13.1)<sup>7</sup> was followed. Shannon Diversity Index and Evenness was analyzed using PAST software version 4.03.

During the two trail surveys we recorded 836 individuals belonging to 68 species. The recorded birds belong to 9 orders, 28 families and 54 Genera (Table-2). The Shannon Diversity index was 3.668, with an evenness value of 0.5763 (Table-1). The taxonomic analysis showed that, the order Passeriformes dominated the bird diversity with 51 species (75%), followed by Accipitri-formes with seven species representing 10% of the total avian diversity (Figure 2).

The lowest number of species was recorded from the order Strigiformes, Podicipediformes, Falconiformes, Bucerotiformes and Trogoniformes, with 1% representation each. The analysis also revealed that the family Muscicapidae (11 species) dominated the avifauna in this area representing more than 16% of the overall diversity (Figure 2 & 3). On the other hand, families such as Strigidae, Rhipiduridae, Passeridae, Fringillidae, Emberizidae, Dicaeidae, Chloropseidae, Trogonidae, Picidae and Upupidae had very poor representation in the study area with less than 1% representation by each (Figure 2 & 3). The most abundant species observed in the study area were Indian White-eye *Zosterops palpebrosus*, Beautiful Sibia *Heterophasia*

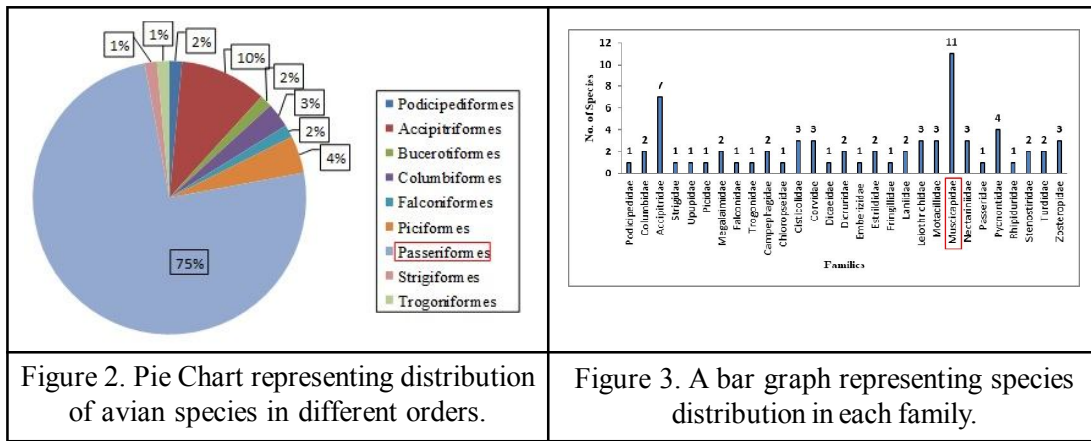


Table-2. List of the birds of Kamlang Wildlife Sanctuary & adjacent areas, with scientific names and conservation status

Order	Family	Common name	Scientific name	No. of individual
Podicipediformes	Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i>	4
Columbiformes	Columbidae	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	2
		Wedge-tailed-Green-Pigeon	<i>Treron sphenurus</i>	12
		Himalayan Griffon	<i>Gyps himalayansis</i>	2
Accipitriformes	Accipitridae	Besra	<i>Accipiter vigratus</i>	1
		Eurasian Sparrowhawk	<i>Accipiter nisus</i>	4
		Black Eagle	<i>Ictinaetus malaiensis</i>	2
		Black Kite	<i>Milvus migrans</i>	3
		Honey-buzzard	<i>Pernis ptilorhynchus</i>	1
		Crested Serpent-eagle	<i>Spilornis cheela</i>	1
		Asian Barred Owllet	<i>Glaucidium cuculoides</i>	2
		Common Hoopoe	<i>Upupa epops</i>	9
Piciformes	Picidae	Greater Yellownappe	<i>Chrysophlegma flavinucha</i>	2
	Megalaimidae	Golden-throated Barbet	<i>Psilopogon franklinii</i>	17
		Great Barbet	<i>Psilopogon virens</i>	13
Falconiformes	Falconidae	Common kestrel	<i>Falco tinnunculus</i>	3
Trogoniformes	Trogonidae	Red-headed Trogon	<i>Harpactes erythrocephalus</i>	1
	Campephagidae	Grey-chinned Minivet	<i>Pericrocotus solaris</i>	34
		Orange Minivet	<i>Pericrocotus flammeus</i>	23
	Chloropseidae	Orange-bellied Leafbird	<i>Chloropsis hardwickii</i>	42
		Grey-breasted Prinia	<i>Prinia hodgsonii</i>	2
	Cisticolidae	Striated Prinia	<i>Prinia crinigera</i>	1
		Black-throated Prinia	<i>Prinia atrogularis</i>	13
		Common Green Magpie	<i>Cissa chinensis</i>	2
	Corvidae	Large-billed Crow	<i>Corvus macrorhynchos</i>	1
		Grey Treepie	<i>Dendrocitta formosae</i>	7



Little Grebe



Crested Serpent-eagle



Asian Barred Owlet



Beautiful Sibia



Wedge-tailed-Green-Pigeon



Red-headed Trogon



Golden-throated Barbet



White-crested Laughingthrush



Grey Treepie



Rusty-fronted Barwing



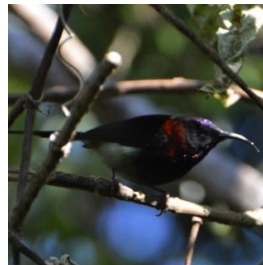
Black-throated Prinia



Verditer Flycatcher



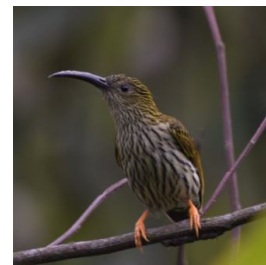
Common Hoopoe



Black-throated Sunbird



Blue-Whistling Thrush



Streaked Spiderhunter

Figure 4. Photographs of some birds taken during the field Survey

Passeriformes	Dicaeidae	Fire-breasted Flowerpecker	<i>Dicaeum ignipectus</i>	4
		Black Drongo	<i>Dicrurus macrocercus</i>	39
	Dicruridae	Spangled Drongo	<i>Dicrurus bracteatus</i>	8
	Emberizidae	Little Bunting	<i>Emberiza pusilla</i>	3
		Scaly-breasted Munia	<i>Lonchura punctulata</i>	17
	Estrildidae	White-rumped Munia	<i>Lonchura striata</i>	3
	Fringillidae	Common Rosefinch	<i>Carpodacus erythrinus</i>	42
		Grey-backed Shrike	<i>Lanius tephronotus</i>	17
	Laniidae	Long-tailed Shrike	<i>Lanius schach</i>	3
		Rusty-fronted Barwing	<i>Actinodura egertoni</i>	3
		White-crested Laughingthrush	<i>Garrulax leucolophus</i>	14
	Leiothrichidae	Beautiful Sibia	<i>Heterophasia pulchella</i>	49
		Olive-backed Pipit	<i>Anthus hodgsoni</i>	26
		Grey Wagtail	<i>Motacilla cinerea</i>	13
	Motacillidae	White Wagtail	<i>Motacilla alba</i>	5
		Oriental Magpie-Robin	<i>Copsychus saularis</i>	9
		Slaty-backed Forktail	<i>Enicurus schistaceus</i>	3
		Verditer Flycatcher	<i>Eumiyas thalassinus</i>	12
		Little-pied Flycatcher	<i>Ficedula westermanni</i>	6
		Blue Rock-Thrush	<i>Monticola solitaries</i>	1
		Chestnut-bellied Rock-thrush	<i>Monticola rufiventris</i>	2
		Blue-Whistling Thrush	<i>Myophonus caeruleus</i>	17
		Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	9
		Plumbeous Water Redstart	<i>Phoenicurus fuliginosus</i>	8
		White-capped Water-Redstart	<i>Phoenicurus leucocephalus</i>	6
	Muscicapidae	Siberian Stonechat	<i>Saxicola maurus</i>	24
		Gould's Sunbird	<i>Aethopyga gouldiae</i>	1
	Nectariniidae	Streaked Spiderhunter	<i>Arachnothera magna</i>	6
		Black-throated Sunbird	<i>Arachnothera saturata</i>	8
	Passeridae	Eurasian Tree-Sparrow	<i>Passer montanus</i>	27
		Striated Bulbul	<i>Alcurus striatus</i>	4
	Pycnontidae	Black Bulbul	<i>Hypsipetes leucocephalus</i>	53
		Mountain Bulbul	<i>Iox mccllellandii</i>	15
	Red-vented Bulbul	<i>Pycnonotus cafer</i>	12	
Rhipiduridae	White-throated Fantail	<i>Rhipidura albicollis</i>	14	
	Yellow-bellied Fantail	<i>Chelidorhynch hypoxanthus</i>	11	
Stenostiridae	Grey-headed Canary-Flycatcher	<i>Culicicapa ceylonensis</i>	16	
	Black-throated Thrush	<i>Turdus atrogularis</i>	13	
Turdidae	White-collared Blackbird	<i>Turdus albocinctus</i>	4	
	Striated Yuhina	<i>staphida castaniceps</i>	2	
	Black-chinned Yuhina	<i>Yuhina nigrimenta</i>	17	
Zosteropidae	Indian White-eye	<i>Zosterops palpebrosus</i>	86	

*pulchella*, Black Bulbul *Hypsipetes leucocephalus*, Black Drongo *Dicrurus macrocercus* and Orange-bellied Leafbird *Chloropsis hardwickii*. While species such as Red-headed Trogon *Harpactes erythrocephalus*, Blue Rock-Thrush *Monticola solitaries*, Oriental Honey-buzzard *Pernis ptilorhynchus*, Crested Serpent-eagle *Spilornis cheela*, and Himalayan Griffon *Gyps himalayansis* were among the least abundant species.

A preliminary survey conducted in the KWS revealed the presence of 68 bird species from 9 orders, 28 families, and 54 genera. The Passeriformes order was the most abundant, constituting 75% of the recorded species. Among the families, Muscicapidae stood out with 11 species, representing over 16% of the bird diversity. The Shannon-Weiner diversity index value of 3.668 indicated a significant number of species, although the evenness value of 0.5763 suggested uneven distribution. The KWS demonstrated considerable avian diversity, thanks to its location adjacent to well protected Namdapha National Park, favorable climate, and effective conservation efforts. Dense forests and water resources played vital roles in supporting bird populations. While the survey did not identify any rare or threatened species, previous reports indicated critically endangered species like the White-bellied Heron, Indian Vulture, White-rumped Vulture, and Slender-billed Vulture in the area, emphasizing the need to protect the sanctuary's habitat. Srinivasan *et al.*<sup>14</sup> reported a remarkable 491 bird species, in Namdapha National park and its adjacent areas, including first sightings of species like the Blyth's Tragopan and Black-faced Warbler, indicating a significant avifaunal diversity in the region.

Singh & Gupta<sup>12</sup> also provided photographic evidence of rare and elusive mammals in the KWS. The conservation of various threatened bird species as well as large cats such as the Bengal Tiger, Common and Clouded Leopards, various mountain ungulates, and other small mammals is vital, and the KWS and Namdapha National Park together form an important landscape for their protection<sup>12</sup>. Additionally, Bam & Manpoong<sup>2</sup> reported a high diversity of tree, shrub, and herb species in the area, indicating remarkable floral and faunal diversity beyond the avian population. The preliminary survey conducted in the sanctuary revealed a rich diversity of bird species. However, the study had limitations such as a small study area and a limited number of surveys. Unfavorable weather conditions prevented surveying during the monsoon season. The survey highlighted concerns regarding hunting and deforestation, emphasizing the importance of awareness programs to promote sustainable practices and protect the sanctuary's biodiversity. Further investigations across the entire gradient are necessary for a comprehensive understanding of avian populations in the area. The survey findings can inform future management and conservation initiatives aimed at preserving the sanctuary's habitat and diverse avian population.

In conclusion, the survey highlights the potential significance of KWS as a critical habitat for a diverse range of bird species. Efforts should be made to address the concerns about hunting and deforestation, and further studies are recommended to overcome the limitations of the earlier survey and obtain a more comprehensive understanding of bird diversity in the sanctuary.

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