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## Study On Avian Diversity During Rainy Season In The Agriculture Landscape Surrounding The Semi Urban Area Of Gwalior District (M.P.) India

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### ABSTRACT:

This research work focuses on the investigation of various bird species that can be found in the agricultural areas around the semi-urban area of Gwalior District. Our study aims to gain a comprehensive understanding of the bird communities thriving in this unique environment by conducting systematic field surveys and collecting data. Through the use of observational methods and scientific techniques, we have identified and documented the different bird species present, taking into account factors such as seasonal variations and habitat preferences. Through our study, 90 species of birds have been recorded under 13 families and 30 orders. By establishing a baseline understanding of avian diversity in this specific context, our research aims to provide valuable insights for promoting sustainable agricultural practices and conserving wildlife. Ultimately, this study not only enhances our understanding of the complex relationships between bird communities and agricultural landscapes but also serves as a basis for making informed decisions regarding land management and biodiversity conservation in semi-urban areas of District Gwalior, Madhya Pradesh, India. Variances are also seen in different seasons.

**Key Words:** Agriculture area, Communities, Biodiversity, Habitat, Wildlife.

## 1. INTRODUCTION

Avifaunal species have great influence in the agriculture sector. According to Birdlife International (2023), about 1210 different species of birds are found in India. Birds play a crucial role in both agriculture and farming. They contribute to soil fertility, aid in pollinating flowering plants, wild plants, and trees, and are essential for controlling insects, pests, and rodents. Scientists have studied that birds can be farmer followers. Most birds are useful to humans by providing meat and eggs as sources of food, facilitating pollination, dispersing seeds and fruits, and biologically controlling insect pests like grasshoppers, mosquitoes, and others (Clout and Hay, 1989). These birds are particularly sensitive to alterations in agricultural practices (Lohr *et al.*, 2002). Natural and atmospheric conditions, along with the expansion of human land use for non-agricultural purposes, influence the degradation rate of avian habitats. According to Bhadja and Vaghela (2013), avifaunal diversity has been decreasing due to the destruction of natural habitats and human disturbances. However, due to the maximum number of birds, they can also cause significant damage to horticultural and agricultural crops by feeding on cereals, grains, vegetables, and ripe fruits. Chauhan *et al.*, (2008) assert that humans do not directly employ birds in agriculture, but birds play several roles in the agro-ecosystem. Most of the birds have specific habitat requirements from season to season, a loss of which may lead to their extinction. The positive effects of organic farming on bird abundance could be independent of any differences in local- and landscape-scale agricultural intensity. However, we also found that the positive effect of organic farming on bird abundance can decrease when controlling for agricultural intensity (Kirk *et al.*, 2020). This diverse landscape facilitated the observation of a variety of bird species, highlighting the intersection between bird diversity and the diverse agricultural landscape. Variations are seen in the number of birds in the Gwalior region.

## 2. MATERIALS AND METHODS

### 2.1. Study Sites:

Our study site is Chinor village, which is located around 40 km from Gwalior. This village panchayat is situated within the Gwalior district of the Madhya Pradesh state, India, with geographical coordinates at latitude 25.949763° and longitude 78.107121°. Chinor Tehsil covers a vast area of 498 km<sup>2</sup>, which is divided into 475.36 km<sup>2</sup> of rural land and 22.74 km<sup>2</sup> of urban land. Gwalior itself encompasses a total land area of 5,21,400 hectares, with 9.70% (50,600 hectares) of this land being utilized for agricultural purposes. Among the Tehsils in Gwalior, Chinor stands out due to its significant contribution to the agricultural sector, accounting for approximately 2% of the overall agricultural area cultivated across all its regions.

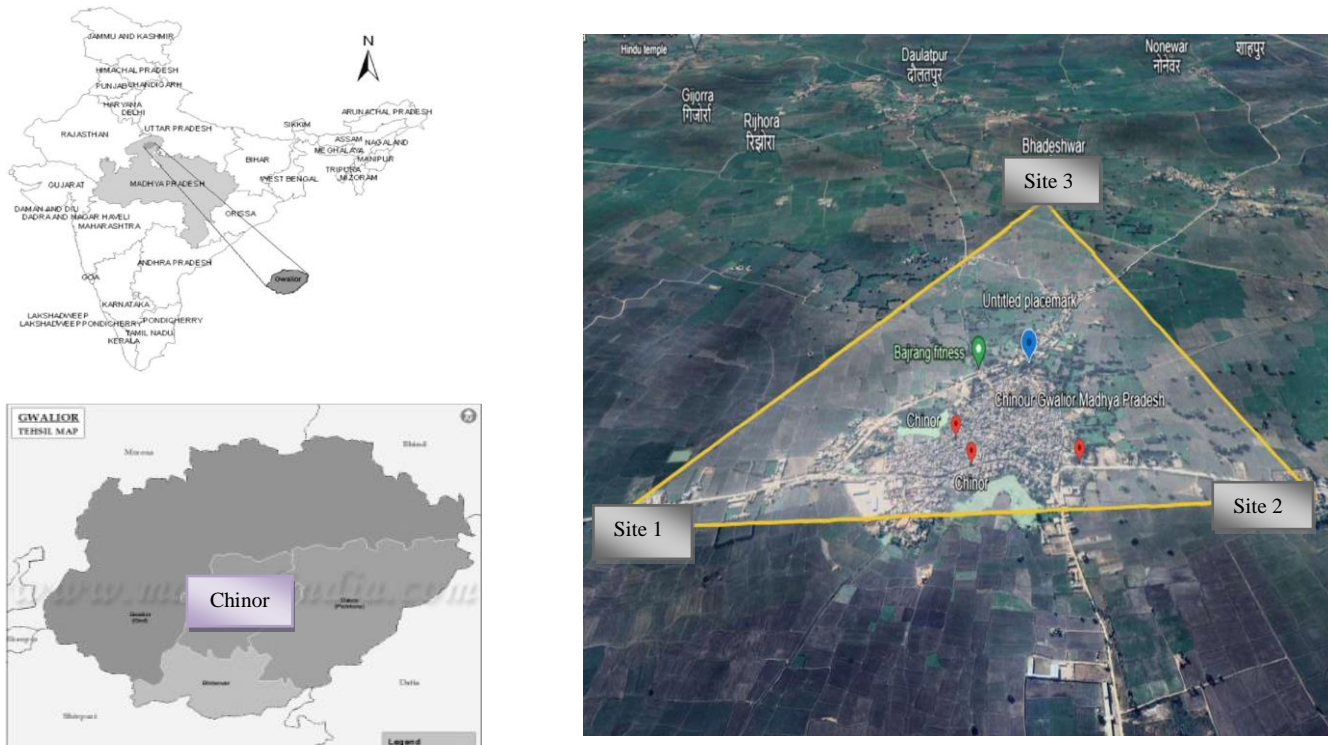


Image 1. Map of Study area Chinor, Gwalior, Madhya Pradesh, India (Source Google Earth)

In order to gain insights into the diverse bird species present in the agricultural areas surrounding our study sites, we conducted research focused on this particular aspect namely Site 1 (Gyan Sarohar school, chinor), Site 2 (Tahsil office chinor), and Site 3 (Bhedeshwar village).



Image 2. Photographs of study sites during rainy season



## 2. Methodology :

The onset of the rainy season in India typically begins in late June, brought about by the impact of monsoon winds, and extends until September. For conducting surveys, the best time slots are between 7:00 a.m. to 11:00 a.m. and 5:00 p.m. to 7:00 p.m. This study spanned over a period of 5 months, from May 2022 to October 2022. The study area was carefully observed using the point transect method and the line transect method to record the avifauna based on their site, location, and habitat type. The frequency of bird sightings was assessed using the following categories: Common (C), observed 17–20 times out of 20 visits. Fairly common (FC), observed 12–16 times out of 20 visits. Uncommon (U), observed 6–11 times out of 20 visits, and Rare (R), observed 0–4 times out of 20 visits (Prajapati and Mahato, 2018). We facilitated the necessary photography by using a 7D Canon SLR camera and Sony 10X digital zoom camera and a for precise record identification. Additionally, a binocular (Olympus, 7 × 50) with Global Position System (GPS) was utilized. Birds observed during the study were categorized into three groups: residential (R), migratory (M), and resident migratory (RM) birds based on their position in each month. The identification of these birds was carried out using prominent reference books, namely Ali *et al.* (2008) and Grimmett *et al.* (2011). It is important to note that all observations made in this study were purely visual, ensuring that no harm was caused to any birds through capture. Consequently, the identification of subspecies was not conducted.

## 3. RESULTS AND DISCUSSIONS

During the period from June 2022 to September 2022, extensive fieldwork was conducted in a semi-urban area, primarily focusing on the agriculture structure. The recent survey findings unveiled a remarkable diversity of avian life, with a total of 90 bird species identified. These species belong to 13 different families and 30 distinct orders. Table provides a comprehensive checklist of recorded bird species, including their Order, Family, Common name, Zoological name, IUCN (International Union Conservation of Nature) status, and Residential/Migratory status. Based on the IUCN Red Data Book, the species documented in the study area were classified as Least Concern (85) with a percentage of 94.44%. Near threatened species accounted for 03 (3.33%), while Vulnerable (V) and Not Assessed (NA) avian species constituted 01 (1.11%) of the recorded species (Image 1). Of the total 64 species recorded, 71% were residential bird species that lived in the area, while 13 species each (14%) were identified as migratory and residential migratory (Image 2). The evaluation of the Avian fauna's abundance status in the study sites is as follows: There are 70 individuals classified as Common, which accounts for 77.77% of the total population. The Uncommon category consists of 05 individuals, representing 5.55% of the population. Lastly, the Fairly Common category includes 15 individuals, making up 16.66% of the population. The largest number of bird species are found in the Passeriformes order, in which 12 families have been recorded (Image 3). Among these families, the Musciapidae family stands out with 07 species in the Passeriformes order.

Urbanization breathes life into agricultural fields across the study sites, transforming them into bustling hubs of activity during the rainy season. While the increase in resident bird populations can be observed in Site 1 (Gyan Sarohar school, chinor) and Site 2 (Tahsil office chinor) as a result of this development, Site 3 (Bhedeshwar village), which encompasses an agro forestry area, plays a significantly larger role. This particular site not only serves as a habitat for local bird species but also serves as a crucial stopover for migratory species such as the Blue Rock Thrush, European Stone Chat, Common Stonechat from the Muscicapidae family, Yellow Wagtail, Gray Wagtail, White Wagtail from Motacillidae, Ashy Drongo from Dicruidae, and Gray Heron from Threskiornithidae. The presence of these species creates a welcoming environment. Additionally, the presence of the Black-headed Ibis from Ardeidae, Common Greenshank, Common Sandpiper, Common Snipe, Little Stint, and Wood Sandpiper from Scolopacidae further reinforces the significance of Site 3. This change in weather provides an opportunity for insectivorous birds such as kingfishers, swallows, lapwings, herons, crows, kites, and owlets to thrive. With an abundance of insects available as food, these bird populations experience a significant increase. The survey conducted in the area revealed a surprising number of birds with varying conservation statuses, according to the IUCN Red Data Book. While commonly classified species such as myna, house crow, bulbul, drongo, lapwing, kingfisher, sparrow, stonechat, pipit, and Indian bill were recorded in high numbers, the study area also served as critical habitat for near-threatened birds like black necked stork (*Ephippiorhynchus asiaticus*), black headed ibis (*Threkiornis melanocephalus*), and alexandrine parakeet (*Psittacula eupatria*). Additionally, vulnerable species like the woolly-necked stork (*Ciconia episcopus*) were found, emphasizing the importance of ongoing conservation efforts (Table). Image 4 provides an overview of the diverse bird families present in the research area. However, certain families such as Ploceidae, Alaudiidae, Estrildidae, and Laniidae (Passeriformes), Phasianidae (Galliformes), Threskiornithidae (Pelecaniformes), Laridae (Charadriiformes), Uppidae (Bucerotiformes), and Phalacrocoracidae (Suliformes) were notable for their scarcity, collectively representing only 1.11% of the total bird population.

#### 4. CONCLUSION

During the period of rainfall in the vicinity of the semi-urban area in Gwalior, this investigation was carried out. The Chinor region has exhibited a notable diversity of avian species, encompassing a total of 90 species belonging to 30 families and 13 orders. The findings underscore the significant contribution of birds to the rainy season, highlighting the rich assortment of avifauna present in this ecosystem, comprising both migratory and non-migratory birds. The rainy ecosystem plays a crucial role beyond serving as a bird habitat. It absorbs carbon dioxide, acts as temporary reservoirs for rains, and provides protection against soil erosion (Gogoi *et al.*, 2023). Various types of farming in these agricultural areas provide nutrition for various bird species. They contribute to pest management by attracting many ducks and shorebirds, as well as local and migratory birds. Protecting the abundant bird diversity in the study area is crucial. The area is

connected to Gwalior City, and human interference and encroachment have visibly reduced the agricultural land. Therefore, active public participation in awareness campaigns and conservation projects will significantly impact preserving the complex balance within the ecosystem of the agriculture region. The study provides valuable insights into the relationships between bird communities and agricultural landscapes, offering a baseline understanding of avian diversity in the specific context of the semi-urban area of Gwalior district. This research serves as a basis for making informed decisions regarding land management and biodiversity conservation in the region. Given the diverse bird species present in the agricultural landscape, the research emphasizes the importance of conservation efforts to maintain biodiversity, promote sustainable agricultural practices, and protect wildlife in the area. Preserving the rich assortment of avifauna is essential for the overall health of the ecosystem.

In conclusion, the research highlights the significance of avian diversity in the agricultural landscape during the rainy season, emphasizing the need for conservation measures and sustainable practices to ensure the well-being of both bird populations and the ecosystem as a whole in the semi-urban area of Gwalior district.

## 5. ACKNOWLEDGMENTS

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**Table : Checklist of Avian Fauna sighted at different Agriculture Landscape of the Study area, IUCN Status, Abundance status and Residential Migration status**

S. No.	Order	Family	Common Name	Zoological Name	IUCN Status	R/M Status	AB status
1	Passeriformes	Cisticolidae	Common Tailorbird	<i>Orthotomus sutorius</i>	LC	R	C
2			Grey Breasted Prinia	<i>Prinia Hodgsonii</i>	LC	R	FC
3			Jungle Prinia	<i>Prinia sylvatica</i>	LC	R	FC
4			Plain Prinia	<i>Prinia inornata</i>	LC	R	C
5		Sturnidae	Asian pied starling	<i>Sturnus contra</i>	LC	R	C
6			bank Myna	<i>Acridotheres ginginianus</i>	LC	R	C
7			Brahminy starling	<i>Sturnus pagodarum</i>	LC	R	C
8			Common myna	<i>Acridotheres tristis</i>	LC	R	C
9			Great Myna	<i>Acridotheres grandis</i>	LC	R	C
10			Jungle Myna	<i>Acridotheres fuscus</i>	LC	RM	C
11		Musciapidae	Pied Bush chat	<i>Saxicola caprata</i>	LC	R	C
12			Blue Rock Thrush	<i>Monticola solitarius</i>	LC	M	UC
13			European stonechat	<i>Saxicola rubicola</i>	NA	M	FC
14			Brown Rock-chat	<i>Cercomela fusca</i>	LC	R	FC
15			Common Stonechat	<i>Saxicola torquata</i>	LC	RM	C

16		Indian Robin	<i>Saxicoloides fulvicata</i>	LC	R	C	
17		White-tailed Stonechat	<i>Saxicola leucurus</i>	LC	R	C	
18	Passeridae	House Sparrow	<i>Passer domesticus</i>	LC	R	C	
19		Indian Silver bill	<i>Lonchura Malabarica</i>	LC	R	C	
20		Rock Sparrow	<i>Petronia petronia</i>	LC	R	C	
21	Motacillidae	Yellow wagtail	<i>Motacilla thunbergi</i>	LC	M	C	
22		Grey Wagtail	<i>Motacilla flava</i>	LC	M	C	
23		Paddy field /Oriental pipit	<i>Anthus rufulus</i>	LC	R	UC	
24		White Wagtail	<i>Motacilla alba</i>	LC	M	FC	
25	Corvidae	Eastern Jungle Crow	<i>Corvus levailantii</i>	LC	R	C	
26		House Crow	<i>Corvus splendens</i>	LC	R	C	
27		Jungle Crow	<i>Corvus macrorhynchos</i>	LC	R	C	
28		Red -Billed Chough	<i>Pyrrhocorax pyrrhocorax</i>	LC	R	C	
29	Dicruridae	Ashy Drongo	<i>Dicrurus leucophaeus</i>	LC	M	FC	
30		Black drongo	<i>Dicrurus macrocerus</i>	LC	R	C	
31		Bronzed Drongo	<i>Dicrurus aeneus</i>	LC	R	C	
32		Racket tailed Drongo	<i>Dicrurus paradiseus</i>	LC	R	C	
33		Spangled Drongo	<i>Dicrurus hottentottus</i>	LC	R	C	
34	Pycnonotidae	Black-crested Bulbul	<i>Pycnonotus melanicterus</i>	LC	R	C	
35		Red-vented Bulbul	<i>Pycnonotus cafer</i>	LC	R	C	
36		Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	LC	R	C	
37	Ploceidae	Baya Weaver	<i>Ploceus philippinus</i>	LC	RM	C	
38	Alaudidae	Skylark	<i>Alauda arvensis</i>	LC	M	C	
39	Estrildidae	Indian silver bill	<i>Euodice malabarica</i>	LC	R	C	
40	Laniidae	Long tailed shrike	<i>Lanius schach</i>	LC	RM	C	
41	Leiothrichidae	Jungle Babbler	<i>Turdoides striata</i>	LC	R	C	
42		Larger grey Babbler	<i>Turdoides malcolmi</i>	LC	R	C	
43	Columbiformes	Columbidae	Eurasian collared Dove	<i>Streptopelia decaocto</i>	LC	R	C
44			Laughing Dove	<i>Streptopelia senegalensis</i>	LC	R	C
45			Oriental Turtle Dove	<i>Streptopelia orientalis</i>	LC	R	C
46			Red collared Dove	<i>Streptopelia tranquebarica</i>	LC	R	FC
47			Rock / Common Pigeon	<i>Columba livia</i>	LC	R	C
48			Spotted Dove	<i>Streptopelia chinensis</i>	LC	R	C
49	Coraciiformes	Meropidae	Blue -tailed bee-eater	<i>Merops philippinus</i>	LC	R	C
50			Blue-bearded Bee-eater	<i>Nyctyornis athertoni</i>	LC	R	C
51			Green bee-eater	<i>Merops orientals</i>	LC	R	C
52		Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>	LC	RM	C
53			Pied Kingfisher	<i>Ceryle rudis</i>	LC	R	C
54			White-throated Kingfisher	<i>Halcyon smyrnensis</i>	LC	R	C

55		Coraciidae	Dollar Bird	<i>Eurystomus orientalis</i>	LC	R	C
56			Indian Roller	<i>Coracias benghalensis</i>	LC	R	C
57	Cuculiformes	Cuculidae	Asian Koel	<i>Eudynamys scolopacea</i>	LC	RM	C
58			Greatet Coucal	<i>Centropus sinensis</i>	LC	R	C
59			Common Hawk Cuckoo	<i>Hierococcyx varius</i>	LC	R	FC
60			Drongo Cuckoo	<i>Surniculus lugubris</i>	LC	R	C
61			Lesser Coucal	<i>Centropus bengalensis</i>	LC	R	C
62			Pied /Jacobin cuckoo	<i>Clamator jacobinus</i>	LC	R	FC
63	Galliformes	Phasianidae	Peacock	<i>Pavo cristatus</i>	LC	R	C
64	Palecaniformes	Ardeidae	Cattle Egret	<i>Bubulcus ibis</i>	LC	RM	C
65			Greater Egret	<i>Casmerodius albus</i>	LC	R	C
66			Grey Heron	<i>Ardea cinerea</i>	LC	RM	C
67			Intermediate Egret	<i>Mesophoyx intermedia</i>	LC	RM	C
68			Little Egret	<i>Egretta garzetta</i>	LC	R	C
69		Threskiornithidae	Black headed Ibis	<i>Threskiornis melanocephalus</i>	NT	M	UC
70	Accipitriformes	Accipitridae	Black Kite	<i>Milvus migrans</i>	LC	R	C
71			Black winged kite	<i>Elanus caeruleus</i>	LC	RM	C
72	Psittaciformes	Psittacidae	Alexandrine Parakeet	<i>Psittacula eupatria</i>	NT	R	FC
73			Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	LC	RM	FC
74			Rose-ringed Parakeet	<i>Psittacula krameri</i>	LC	R	C
75	Charadriiformes	Charadriidae	Red-wattled lapwing	<i>Vanellus indicus</i>	LC	R	C
76			Yellow wattled lapwing	<i>Vanellus malabaricus</i>	LC	R	UC
77		Scolopacidae	Common Greenshank	<i>Tringa nebularia</i>	LC	M	C
78			Common sandpiper	<i>Actitis hypoleucos</i>	LC	M	C
79			Common Snip	<i>Gallinago gallinago</i>	LC	M	FC
80			Little-Stint	<i>Calidris minuta</i>	LC	M	FC
81			Wood sandpiper	<i>Tringa glareola</i>	LC	M	C
82		Laridae	Ring Bill Gull	<i>Larus delawarensis</i>	LC	R	C
83	Bucerotiformes	Upupidae	Common Hoopoe	<i>Upupa epops</i>	LC	RM	C
84	Piciformes	Picidae	Black-rumped Flameback	<i>Dinopium benghalense</i>	LC	R	C
85			Brown-capped Pygmy woodpecker	<i>Dendrocopos nanus</i>	LC	R	FC
86			Fulvous-breasted Woodpecker	<i>Dendrocopos nanus</i>	LC	R	C
87			Yellow-crowned woodpecker	<i>Dendrocopos mahrattensis</i>	LC	R	C
88	Ciconiiformes	Ciconiidae	Black necked Stork	<i>Ephippiorhynchus asiaticus</i>	NT	R	UC
89			Woolly-necked stork	<i>Ciconia episcopus</i>	V	R	FC
90	Suliformes	Phalacrocoracidae	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	LC	RM	C

**Abbreviations:** LC - Least Concern, V -Vulnerable, CE - Critically Endangered, E - Endangered, NA - Not Assessed, NT - Near Threatened, R - Residential, M - Migratory, UC - Uncommon, C - Common, FC - Fairly Common, AB - Abundance Status.



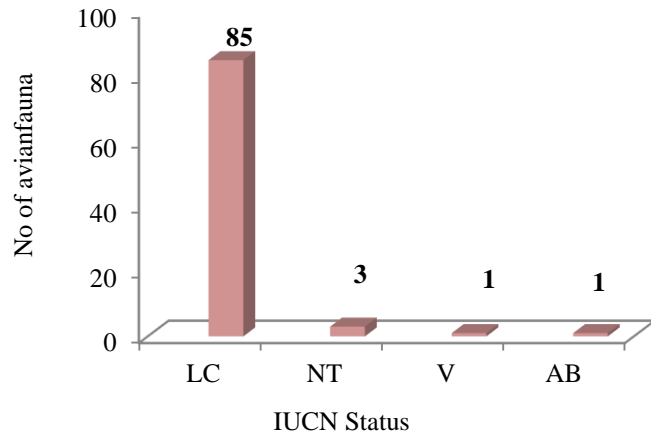


Image 1: Species composition According to IUCN Status

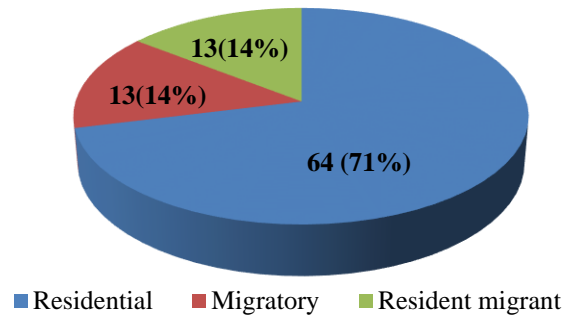


Image 2: Species composition according to Residential

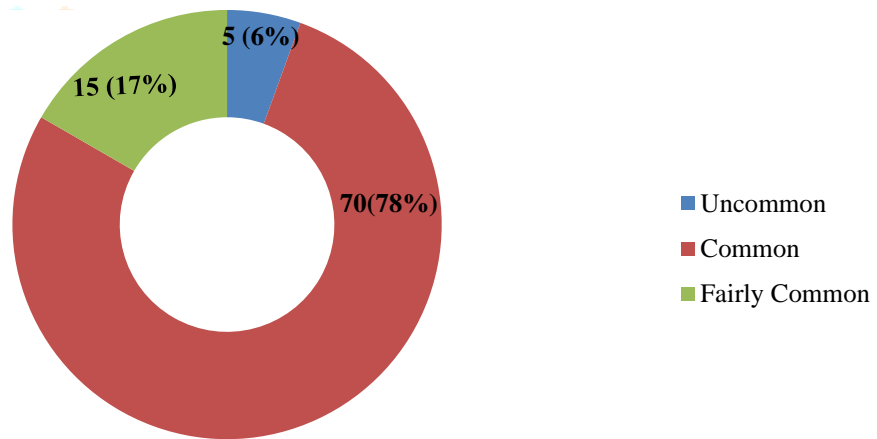
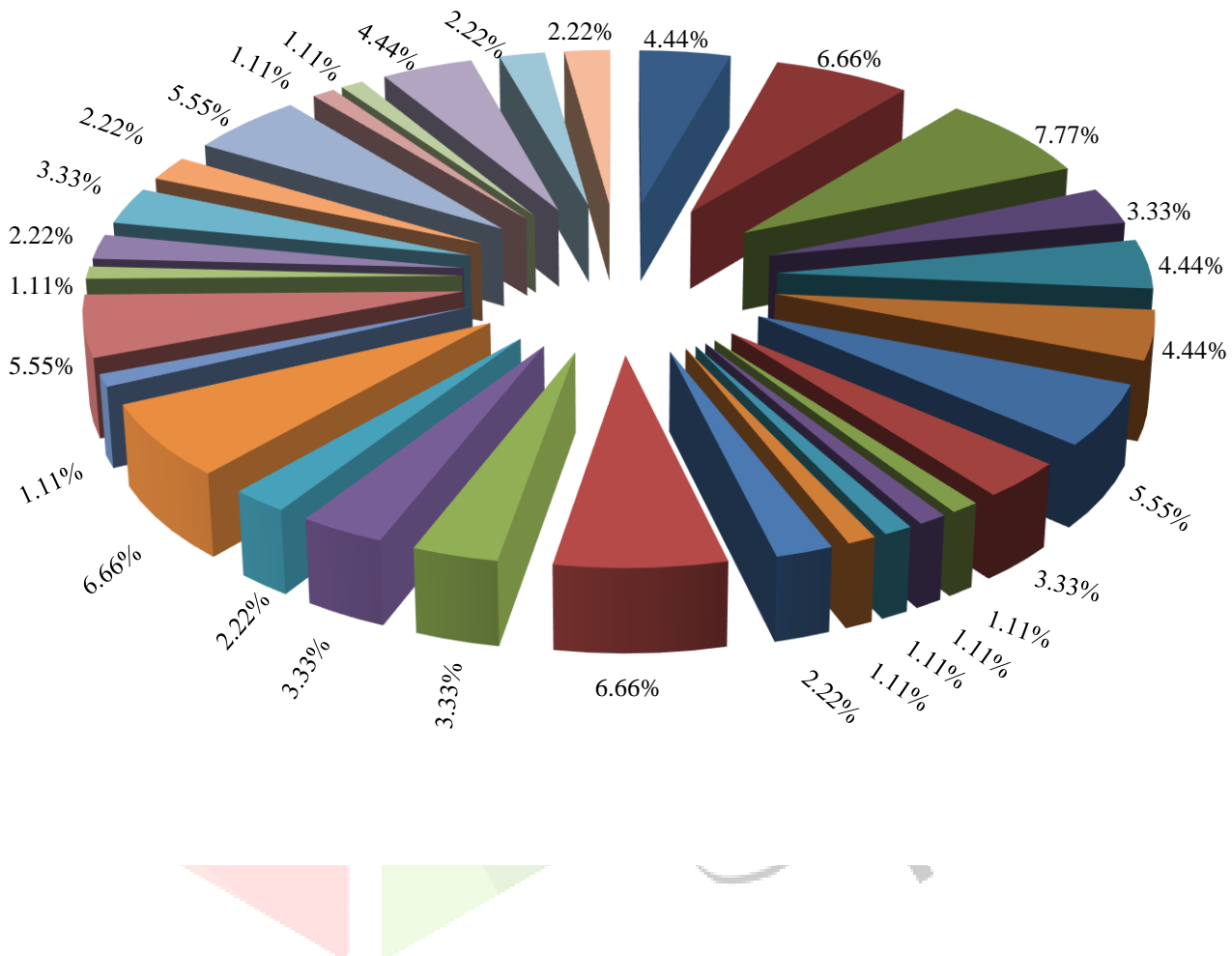


Image 3: Abundance Status of Bird Species

Image 4. Name of Families

- Cisticolidae 4.44%
- Motacillidae 4.44%
- Ploceidae 1.11%
- Leiothrichidae 2.22%
- Coraciidae 2.22%
- Threskiornithidae 1.11%
- Scolopacidae 5.55%
- Ciconiidae 2.22%
- Sturnidae 6.66%
- Corvidae 4.44%
- Alaudidae 1.11%
- Columbidae 6.66%
- Cuculidae 6.66%
- Laridae 1.11%
- Phalacrocoracidae 2.22%
- Musciapidae 7.77%
- Dicruridae 5.55%
- Estrildidae 1.11%
- Meropidae 3.33%
- Phasianidae 1.11%
- Psittacidae 3.33%
- Upupidae 1.11%
- Passeridae 3.33%
- Pycnonotidae 3.33%
- Laniidae 1.11%
- Alcedinidae 3.33%
- Ardeidae 5.55%
- Charadriidae 2.22%
- Picidae 4.44%



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