



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(8): 1357-1364
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www.thepharmajournal.com

Received: 01-05-2023

Accepted: 08-07-2023

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Seasonal dynamics of avian diversity in mine spoil afforested areas: A study in and around NLCIL, Neyveli

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DOI: <https://doi.org/10.22271/tpi.2023.v12.i8p.22183>

Abstract

Bird biodiversity encompasses the variety and abundance of bird species within a given geographic area. The diversity of bird species is influenced by various factors including habitat availability, climate, geographic feature and human activities. Conservation efforts focusing on bird biodiversity are crucial for maintaining ecosystem balance, preserving biodiversity and ensuring the long-term survival of avian population. This study aimed to document the seasonal variation of avian diversity in and around NLCIL, Neyveli, during the period from October 2022 to June 2023. A total of 107 bird species were recorded belonging to 18 orders and 45 families. The highest number of avian populations were observed during the summer season, specifically from April to June. Additionally, the study identified three Near Threatened species and five migratory birds in the study area. These findings highlight the ecological significance of the mining area.

Keywords: bird, biodiversity, seasonal variation, population

Introduction

Biodiversity plays a crucial role in sustainable landscape development as it serves as a fundamental ecological, economic and social/cultural resource that forms the foundation for the sustainability of any region. The presence of diverse species within ecosystems generally have positive impact on their overall quality (Nautiyal *et al.*, 2013) [12]. But, habitat for wildlife are experiencing a decline and degradation globally, primarily as a result of developmental activities. Birds are known to be highly responsive to changes in habitat parameters, making them sensitive species. Their presence in various habitat types demonstrate their ability to tolerate a wide range of ecological conditions (Arati *et al.*, 2021). It is important to recognize that each species has a role to play in maintaining ecological balance and a healthy environment. Birds are recognized as crucial species for the conservation of biodiversity. They serve as valuable indicators of even minor changes occurring within the biodiversity (Patel *et al.*, 2022) [13]. Conducting taxonomic studies and exploring the diversity of flora and fauna are crucial in assessing the threatened status of wild species. These assessments serve as a basis for implementing conservation measures aimed at preserving and protecting endangered species and their habitats. By understanding the taxonomic composition and ecological dynamics of ecosystems, conservation efforts can be targeted effectively to safeguard biodiversity and maintain a sustainable environment (Reddy *et al.*, 2014) [15]. Biodiversity of avian and wildlife in a particular area is influenced by various biotic and abiotic factors. Coastal regions known for their rich avian biodiversity particularly in sea birds are often significant importance. However the mining activity poses a hindrance to the movement of avian fauna impacting their natural mobility and behavior (A.k, 2018) [1].

Mining operations involve the extraction of various minerals such as limestone, bentonites and lignite. Because of the extraction of minerals and dumping of waste materials in the open ground will leads to loss of habitat. Mining area experience significant physical transformations that disrupt the structure and composition of vegetation, impeding the recovery of local biodiversity (Barros *et al.*, 2022) [7]. The loss of habitat and biological biodiversity caused by mining and its related activities disrupts the ecological balance leading to imbalance within ecosystems and this imbalance can have far reaching consequences on the functioning and stability of natural environment. Apart from mining activities, significant portions of forests and wildlife habitats are being cleared for various purposes such as agriculture, industry road, railway networks and human settlements.

This extensive clearance of land results in habitat degradation (Gajera *et al.*, 2013)^[9]. The impact of mining area anticipated to differ depending on the stage of development. Cumulative environmental effect stemming from pollution, the construction of infrastructure, changes in the physical landscape, the direct and indirect consequences of habitat loss, degradation and fragmentation can be challenging to estimate or foresee accurately. (Rodewald *et al.*, 2019)^[16]. The open and regional impact of open-pit mining are widely recognized and were observed throughout the history (Bendell, 2011)^[3]. Till date, there is no any research paper in this study area. So, it is crucial to fulfill this gap in evidence to start the bird conservation in the area. Therefore, the aim of this study is to explore the seasonal variation in NLCIL, Neyveli.

Materials and Methods

Study area

The study were conducted in four major sites of Neyveli Lignite Corporation India Limited (NLCIL) namely Mine I, Mine IA, Mine II and Neyveli Township. Neyveli is township situated in the Cuddalore district of the southern Indian state of Tamil Nadu. Cuddalore district is situated in the eastern coastal region of the state bordered by Villupuram district to the north, Nagapattinam district to the south, Perambalur and

Villupuram district to the west and the Bay of Bengal to the east. The district falls within agro climatic zone II (East Coast Plain and Hills) and has an altitude of 4.6 meter above mean sea level (MSL). All district’s administrative center is located in Cuddalore. NLCIL is a central public sector undertaking under the administrative control of coal, government of India. Founder of NLC is T.M Jambulingam Mudaliar (1956) in his own farm. Open cast type of mining is followed in NLC. Neyveli situated at coordinates 11.60°N latitude and 79.48°E longitude. It has an average elevation of 87 meter (285ft.) above sea level. The township is strategically positioned along the Chennai-tanjavur National highway. Neyveli is a systematically planned township, characterized by its subdivision into distinct blocks. In total there are total 30 blocks within the township each covering an approximate area of 1 square kilometer. The corresponding Mine I, Mine IA, Mine II and Neyveli Township sites are spread over 2669 hectares, 1160 hectares, 2774.94 hectare and 3500 hectares respectively. Various tree species, including *Mangifera indica*, *Azadirachta indica*, *Moringa olerifera*, *Delonix regia*, *Acacia auriculiformis*, *Dalbergia sissoo*, *Leucaena leucocephala* etc. are observed in afforested mining areas. These tree plantations play a crucial role in preserving avian biodiversity.

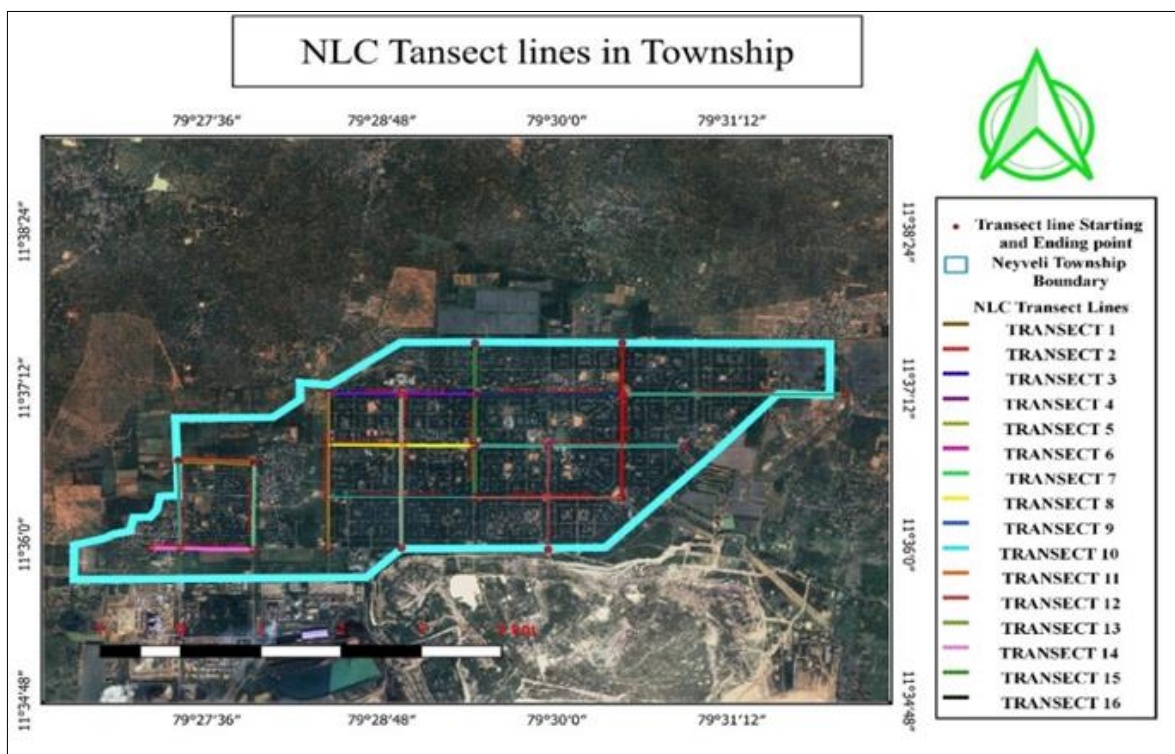


Fig 1: Showing the Map of Study area

Table 1: Study period

Month	Season
October 2022 to December 2022	Monsoon
January 2023 to March 2023	Winter
April 2023 to June 2023	Summer

The study period takes place for one week in every three seasons. The same transect lines and sampling time were employed consistently throughout this period. This approach ensured consistency and comparability in data collection

allowing for the examination of potential variations and patterns over time within the study area. Surveys were made in morning (6.30 am to 9.30 am) and evening hours (3.30 pm to 6.30 pm) throughout this period. The particular location of the surveying of birds was recorded by using GPS device. Range finder were used to measure the distance from the transect line to the birds. Binoculars were used to identify the bird species from the long distance from the transect. A camera was employed for the purpose of identification. I referred The Book of Indian Birds by Salim Ali for this study.

Sampling method

Line transect method

Line transects method is a quantitative approach for comparison of habitat (Bibby *et al.*, 1992)^[6]. To conduct the survey, transect route were established cutting across the survey stands in relatively straight line at different angles. However, existing trails were utilized whenever possible to minimize disruption caused by obstacles and to establish clear reference lines for estimating lateral distances. This approach aimed to provide a standardized methodology for conducting the survey and obtaining accurate measurement (Emlen, 1971)^[8].

Point count method

The wetland bird composition is to be estimated through “Total count method or Direct count method or point count method”. It was used wherever possible by walking around the wetlands and count all the wetland birds (Guptha *et al.*, 2011)^[11].

Data Collection

We established multiple transect lines in four distinct areas within NLCIL, Neyveli. In Mine I, two lines transect were conducted with distance of 1.69 km and 1.56 km respectively. Point counts were also carried out in 2 lakes within Mine I, namely Township View Point Lake and Mine I Lake 2. Similarly, in Mine IA, point count method was used to survey three lakes: Mine IA Lake 1, Mine IA Lake 2, and Mine IA Lake 3. In Mine II, a single line transects measuring 1.22km was conducted along with point counts in two Lakes: Mine II View Point Lake and Mine II Boat House Lake. In the township surrounding NLC, a total of 15 line transect were performed each spanning a distance of 1kilometer.

Result

The survey conducted in NLCIL, Neyveli was specifically carried out due to the absence of existing records on the diversity of birds in the area. During the survey conducted in and around mining areas of NLCIL (Neyveli Lignite Corporation India Limited) over three seasons (Monsoon, Winter, Summer), a total of 107 different species were recorded. When considering the terrestrial and wetland areas within the study area, a total of 11 orders are observed in the terrestrial areas, while the wetland areas are represented by 10 orders. Terrestrial exhibits a higher diversity at the family level also with 33 different families identified whereas, the wetland area shows a slightly lower diversity with 12 families. The white stork and white Ibis can be only observed during the monsoon season among the 3 seasons. When comparing the orders in the checklist of avian population in the terrestrial area, it is observed that passeriformes are highest number of families, totaling 20, which constitutes 60 % of the total. Following closely behind are the orders Coraciiformes, Cuculiformes and Piciformes each with a percentage of 6.06% (2 families). The remaining orders including Accipitriformes, Apodiformes, Columbiformes, Galliformes, Psittaciformes, Strigiformes and Upupiformes each contribute 3% (1 family) to overall avian population in the terrestrial area (Figure 2). In case of wetlands, the orders Charadriiformes, Pelecaniformes, and Suliformes have the highest number of families, totaling 2, which represents 15.38% of the total avian population in the wetland area. The remaining orders namely anseriformes, ciconiiformes, coraciiformes, gruiformes, passeriformes, podicipediformes and strigiformes each contribute 7.69% (1 family) to the overall avian population in the wetland area (Figure 3).

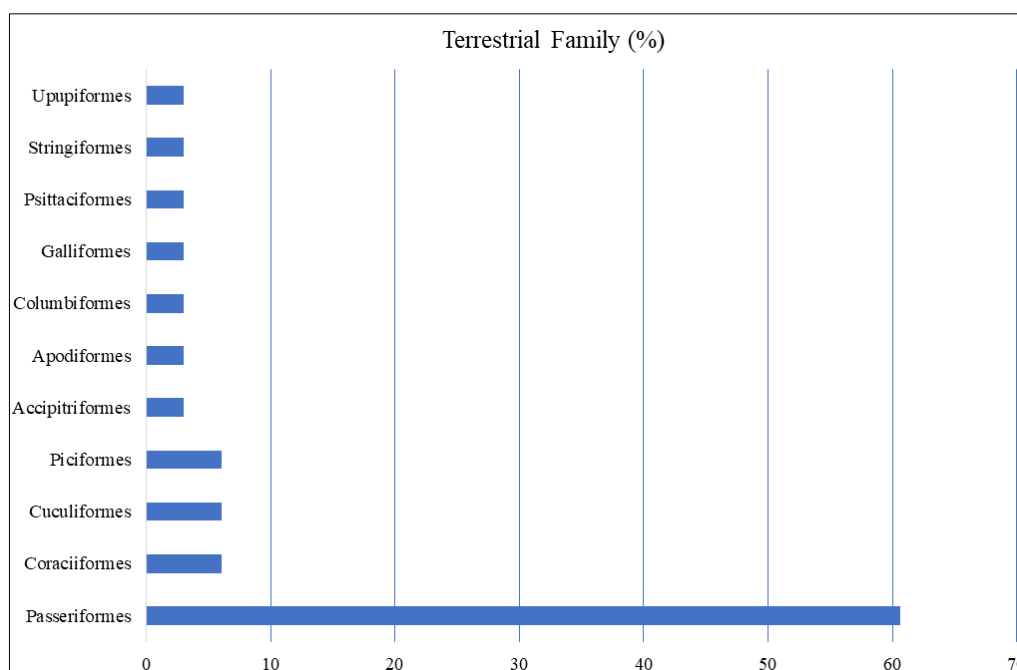


Fig 2: Order wise population (Terrestrial birds)

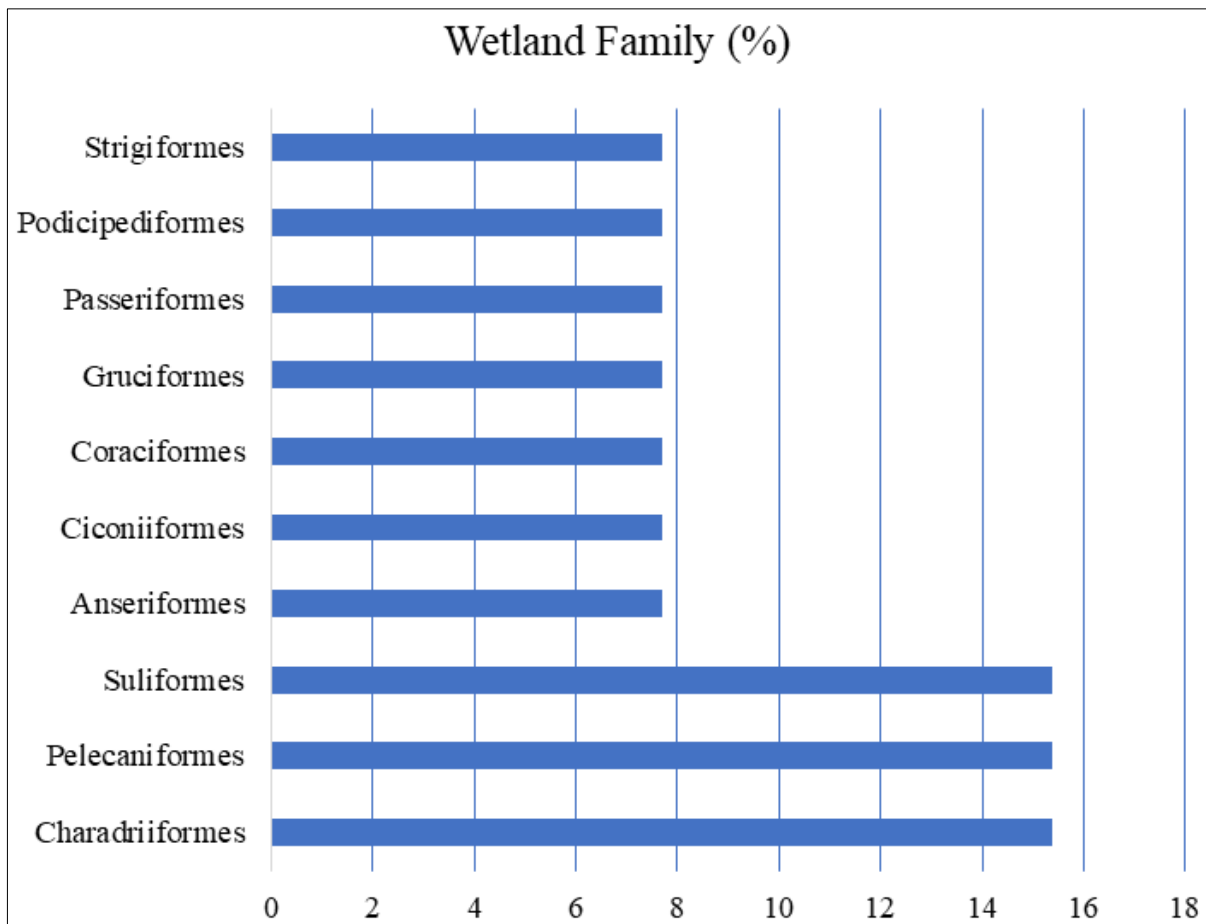


Fig 3: Order wise population (Wetland birds)

Data comparison among three seasons

The avian diversity in and around NLCIL, Neyveli shows seasonal variation during the three main seasons: Monsoon, Winter and Summer. Specifically, 74, 49 and 81 distinct species were observed in each respective season. It is noteworthy that the summer season a greater variety of species including a higher number of orders compared to the other seasons.

In the monsoon season (October to December) the terrestrial area exhibits a higher number of bird species belonging to the order passeriformes accounting for 61.81% of the total and followed by cuculiformes with 12.72 % and accipitriformes and coraciiformes with 5.45% each. The orders psittaciformes and piciformes exhibit the lowest representation accounting for 1.81% each. On the other hand, the wetland area shows a higher abundance of species in the order Pelecaniformes constituting 36.84 % of the avian population and lowest was shown by Strigiformes followed by charadriiformes and ciconiiformes with 5.26 % (Figure 3). Similarly, during the winter season (January to March) the terrestrial area is dominated by the order passeriformes which comprises the highest number of species at 64.86 % following passeriformes, the order Coraciiforms and Cuculiformes exhibit proportions of 8.10% each. On the other hand, the order accipitriformes, apodiformes, galliformes, piciformes and psittaciformes are each represented by 2.70 % of the total species observed in the terrestrial area during the winter season. In contrast, the wetland area has the maximum number of species in the order coraciiforms and pelecaniformes accounting for 27.27 % each of the avian population and least shown by anseriformes, strigiformes and

suliformes with 9.09% each (Figure 4). Moving on to the summer season (April to June), the pattern observed in the terrestrial area remain consistent with passeriformes containing the highest number of avian species at 58.69%. Then by Cuculiformes with 8.69% and least is shown by apodiformes, piciformes, psittaciformes, upupiformes and strigiformes with 2.17% each. However, in the wetland area, the order ciconiiformes emerges as the dominant group also accounting for 50% of the avian population and in this category least is showed by anseriformes, pelecaniformes, podicipediformes and strigiformes 3.57% each (Figure 5).

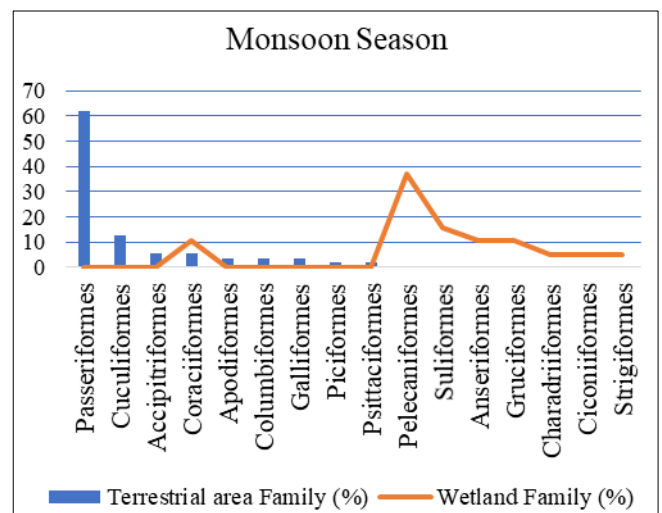


Fig 4: Order wise Family population (Monsoon Season)

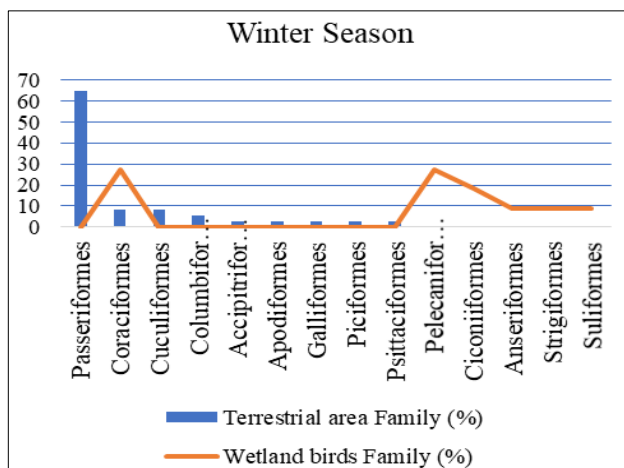


Fig 5: Order wise Family population (Winter Season)

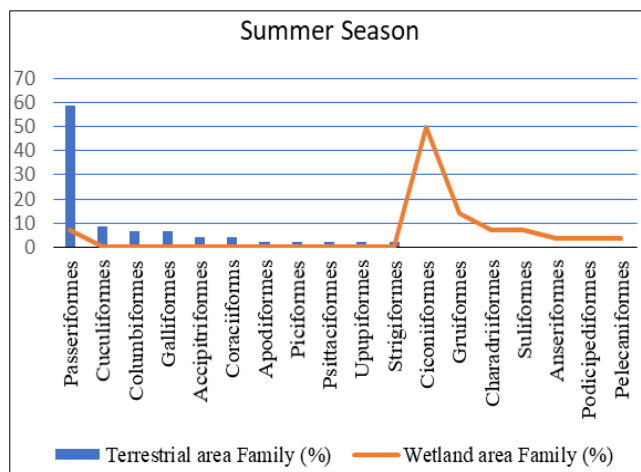


Fig 6: Order wise Family population (Summer Season)

Table 2: Showing the distribution of every family within the order

S. No	Order	Family	Number of Species	Percentage (%)
1.	Accipitriformes	Accipitridae	4	3.70
2.	Anseriformes	Anatidae	2	1.86
3.	Apodiformes	Apodidae	2	1.86
4.	Charadriiformes	Charadriidae	1	0.93
		Recurvirostridae	1	0.93
5.	Ciconiiformes	Ciconiidae	2	1.86
6.	Columbiformes	Columbidae	5	4.67
7.	Coraciiformes	Alcedinidae	3	2.80
		Coraciidae	1	0.93
		Meropidae	4	3.73
8.	Cuculiformes	Centropomidae	1	0.93
		Cuculidae	6	5.60
9.	Galliformes	Phasianidae	3	2.80
10.	Gruiformes	Rallidae	4	3.70
11.	Passeriformes	Acrocephalidae	1	0.93
		Alaudidae	3	2.80
		Artamidae	1	0.93
		Cisticolidae	4	3.73
		Corvidae	6	5.60
		Dicaeidae	1	0.93
		Dicruridae	5	4.67
		Estrildidae	3	2.80
		Hirundinidae	3	2.80
		Laniidae	1	0.93
		Leiothrichidae	1	0.93
		Monarchidae	1	0.93
		Motacillidae	1	0.93
		Muscicapidae	5	4.67
		Nectariniidae	3	2.80
		Passeridae	1	0.93
		Ploceidae	2	1.86
		Pycnonotidae	2	1.86
		Sylviidae	1	0.93
		Sturnidae	2	1.86
		Vangidae	1	0.93
12.	Pelecaniformes	Ardeidae	8	7.47
		Threskiornithidae	1	0.93
13.	Piciformes	Megalaimidae	1	0.93
		Picidae	1	0.93
14.	Podicipediformes	Podicipedidae	1	0.93
15.	Psittaciformes	Psittaculidae	1	0.93
16.	Strigiformes	Strigidae	2	1.86
17.	Suliformes	Anhingidae	1	0.93
		Phalacrocoracidae	3	2.80
18.	Upupiformes	Upupidae	1	0.93
	Total		107	100

In total, the avian species found in and around NLC belongs to 18 different orders and are categorized into a total of 45 families. The order with the highest number of species is passeriformes, representing 45.65% of the total avian population. Following closely behind are the order coraciiforms, corvidae and cuculidae each having a notable percentage of species at 5.60% within their respective family (Table 2).

Discussion

Our study focused on the seasonal fluctuation of bird diversity in the vicinity of NLCIL, Neyveli. The passeriformes order accounted for the highest number of recorded species among the total identified species. The study conducted by Chaudhary *et al.* (2009)^[6] in Khata corridor Forest, Nepal, revealed that passeriformes was numerically the dominant order. Likewise, the study conducted by Husein and Sultan (2009)^[12] in Nansebo Forest, South Ethiopia also recorded the highest number of species from the passeriformes order. The order passeriformes has been consistently reported as the most dominant order by various studies (Bhat and Bhat, 2012; Singh *et al.*, 2013)^[5, 20]. Passeriformes exhibit high diversity due to their adaptability to various habitats and their consumption of a wide range of food items, including invertebrates, grains, nuts, floral buds, fruit, and nectar (Beresford *et al.*, 2005)^[4]. In their study on Avian diversity in the Bhoj wetland, Vyas *et al.* (2010) reported a similar observation noting that the ardeidae family emerged as the most dominant with a representation of eight species. Most of the families in our study belong to the ardeidae family as well with eight species. Upadhyay *et al.*, (2019)^[22] documented an increase in the population of Egrets during the monsoon period in the Bharatpur wetland attributing it to their breeding season which we have also observed in our study. Pawar and Wanjari (2003)^[16] observed that the highest number of bird species was documented during the summer and winter seasons, followed by monsoon period. Among the 37 species of waterbirds recorded by Mohanraj *et al.* (2022)^[11] the Indian Little cormorant exhibit a higher count compared to other recorded waterbird species in the lake during the study period particularly during the monsoon season which is consistent with our study findings.

Corroborating our study, Kershaw and Cranswick (2003)^[13] found that the composition of the water bird community during monsoon and winter months differs significantly from the summer season. This disparity in composition could be attributed to the increased mobility of birds during this period as they respond to environmental stresses.

Conclusion

The seasonal variation of bird diversity in mine spoil afforested areas in and around NLCIL, Neyveli explores how bird species composition and abundance changes throughout different seasons. The presence of migratory birds in the area signifies the significance of critical habitat for these organisms. Additionally, their occurrences suggest that the area provides favorable conditions for breeding, feeding, and nesting. Studies indicate that birds migrate to different areas in response to seasonal changes. However, the escalating anthropogenic activities pose a significant concern when it comes to the future survival of these species. The study highlights the needs to implement specific conservation strategies to safeguard near-threatened species such as the

Darter, Oriental White Ibis and Painted Stork. The information collected in this study can serve as valuable insights for guiding conservation efforts. The impact of human encroachment on avian diversity can be assessed as well.

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Appendix

S. No.	Species name	Scientific name	Order	Family
1	Ashy Crowned Sparrow Lark *	<i>Eremopterix griseus</i>	Passeriformes	Alaudidae
2	Ashy Drongo *!	<i>Dicrurus leucophaeus</i>	Passeriformes	Dicruridae
3	Ashy Prinia !	<i>Prinia socialis</i>	Passeriformes	Cisticolidae
4	Ashy Wood Swallow *!	<i>Artamus fuscus</i>	Passeriformes	Artamidae
5	Asian Brown Flycatcher !	<i>Muscicapa dauurica</i>	Passeriformes	Muscicapidae
6	Asian Green Bee-Eater *!~	<i>Merops orientalis</i>	Coraciiformes	Meropidae
7	Asian Koel *!~	<i>Eudynamis scolopaceus</i>	Cuculiformes	Cuculidae
8	Asian Palm Swift *	<i>Cypsiurus balasiensis</i>	Apodiformes	Apodidae
9	Asian Paradise-Flycatcher *~	<i>Terpsiphone paradisi</i>	Passeriformes	Monarchidae
10	Barn Swallow *~	<i>Hirundo tahitica</i>	Passeriformes	Hirundinidae
11	Baya Weaver ~	<i>Ploceus philippinus</i>	Passeriformes	Ploceidae
12	Black Drongo *!~	<i>Dicrurus macrocerus</i>	Passeriformes	Corvidae
13	Black Kite *!~	<i>Milvus migrans</i>	Accipitriformes	Accipitridae
14	Black Winged Stilt ~	<i>Himantopus himantopus</i>	Charadriiformes	Recurvirostridae
15	Black-Crowned Night-Heron *~	<i>Nycticorax nycticorax</i>	Pelecaniformes	Ardeidae
16	Black-Headed Munia ~	<i>Lonchura malacca</i>	Passeriformes	Estrildidae
17	Blue Rock Pigeon *!~	<i>Columba livia</i>	Columbiformes	Columbidae
18	Blue Tailed Bee-Eater *	<i>Merops philippinus</i>	Coraciiformes	Meropidae
19	Blue-Cheeked Bee-Eater ~	<i>Merops persicus</i>	Coraciiformes	Meropidae
20	Booted Warbler !	<i>Iduna caligata</i>	Passeriformes	Acrocephalidae
21	Brahminy Kite ~	<i>Haliastur indus</i>	Accipitriformes	Accipitridae
22	Brahminy Starling *!~	<i>Sturnus pagodarum</i>	Passeriformes	Sturnidae
23	Brain fever Bird or Hawk-Cuckoo *	<i>Hierococcyx varius</i>	Cuculiformes	Cuculidae
24	Brown Shrike *	<i>Lanius cristatus</i>	Passeriformes	Laniidae
25	Cattle Egret *~	<i>Bubulcus ibis</i>	Pelecaniformes	Ardeidae
26	Chestnut Bittern ~	<i>Ixobrychus cinnamomeus</i>	Pelecaniformes	Ardeidae
27	Chestnut Headed Bee Eater * ~	<i>Merops leschenaulti</i>	Coraciiformes	Meropidae
28	Common Coot *~	<i>Fulica atra</i>	Gruiformes	Rallidae
29	Common Cuckoo *!~	<i>Cuculus canorus</i>	Cuculiformes	Cuculidae
30	Common Hoopoe ~	<i>Upupa epops</i>	Upupiformes	Upupidae
31	Common Moorhen ~	<i>Gallinula chloropus</i>	Gruiformes	Rallidae
32	Common Myna *!~	<i>Acridotheres tristis</i>	Passeriformes	Sturnidae
33	Common Quail ~	<i>Coturnix coturnix</i>	Galliformes	Phasianidae
34	Common Tailorbird ~	<i>Orthotomus sutorius</i>	Passeriformes	Cisticolidae
35	Common Wood Shrike *!~	<i>Tephrodornis pondicerianus</i>	Passeriformes	Vangidae
36	Copper Smith Barbet ~	<i>Megalaima haemacephala</i>	Piciformes	Megalaimidae
37	Crimson Backed Sunbird *!~	<i>Leptocoma minima</i>	Passeriformes	Nectariniidae
38	Crow Billed Drongo *~	<i>Dicrurus annectans</i>	Passeriformes	Dicruridae
39	Darter or Snake Bird ! ~	<i>Anhinga melanogaster</i>	Suliformes	Anhingidae
40	Eurasian Collared Dove *	<i>Streptopelia decaocto</i>	Columbiformes	Columbidae
41	Eurasian Golden Oriole *!~	<i>Oriolus oriolus</i>	Passeriformes	Corvidae
42	Great Cormorant *!~	<i>Phalacrocorax carbo</i>	Suliformes	Phalacrocoracidae
43	Great Horned Owl *!~	<i>Bubo virginianus</i>	Strigiformes	Strigidae
44	Greater Coucal *!~	<i>Centropus sinensis</i>	Cuculiformes	Centropomidae

45	Grey Francolin *~	<i>Francolinus pondicerianus</i>	Galliformes	Phasianidae
46	Grey Heron *!~	<i>Ardea Cinerea</i>	Pelecaniformes	Ardeidae
47	Grey Wagtail ~	<i>Motacilla cinerea</i>	Passeriformes	Motacillidae
48	House Crow *!~	<i>Corvus splendens</i>	Passeriformes	Corvidae
49	House Swift *!~	<i>Apus affinis</i>	Apodiformes	Apodidae
50	Indian Peafowl *!~	<i>Pavo cristatus</i>	Galliformes	Phasianidae
51	Indian Pond-Heron *!~	<i>Ardeola grayii</i>	Pelecaniformes	Ardeidae
52	Indian Robin *!~	<i>Saxicoloides fulicatus</i>	Passeriformes	Muscicapidae
53	Indian Roller !~	<i>Coracias benghalensis</i>	Coraciiformes	Coraciidae
54	Indian Shag *	<i>Phalacrocorax fuscicollis</i>	Suliformes	Phalacrocoracidae
55	Indian Treepie *!~	<i>Dendrocitta vagabunda</i>	Passeriformes	Corvidae
56	Jungle Babbler *!~	<i>Turdoides striata</i>	Passeriformes	Sylviidae
57	Jungle Crow *!~	<i>Corvus macrorhynchos</i>	Passeriformes	Corvidae
58	Large Pied Wagtail ~	<i>Motacilla maderaspatensis</i>	Passeriformes	Passeridae
59	Lesser Coucal *~	<i>Centropus bengalensis</i>	Cuculiformes	Cuculidae
60	Lesser Golden-Backed Woodpecker *!~	<i>Dinopium banghalense</i>	Piciformes	Picidae
61	Lesser Pied Kingfisher !~	<i>Ceryle rudis</i>	Coraciiformes	Alcedinidae
62	Little Brown Dove ~	<i>Streptopelia senegalensis</i>	Columbiformes	Columbidae
63	Little Cormorant *!~	<i>Phalacrocorax niger</i>	Suliformes	Phalacrocoracidae
64	Little Egret *~	<i>Egretta garzetta</i>	Pelecaniformes	Ardeidae
65	Little Grebe ~	<i>Tachybaptus ruficollis</i>	Podicipediformes	Podicipedidae
66	Little Green Heron ~	<i>Butorides striatus</i>	Pelecaniformes	Ardeidae
67	Median Egret *!	<i>Ardea intermedia</i>	Pelecaniformes	Ardeidae
68	Oriental Honey Buzzard *	<i>Pernis ptilorhynchus</i>	Accipitriformes	Accipitridae
69	Oriental Magpie Robin *!~	<i>Copsychus saularis</i>	Passeriformes	Muscicapidae
70	Oriental White Ibis *	<i>Threskiornis melanocephalus</i>	Pelecaniformes	Threskiornithidae
71	Painted Stork !~	<i>Mycteria leucocephala</i>	Ciconiiformes	Ciconiidae
72	Pied Bush Chat *!~	<i>Saxicola Caprata</i>	Passeriformes	Muscicapidae
73	Plain Flowerpecker *!~	<i>Dicaeum concolor</i>	Passeriformes	Dicuridae
74	Plain Prinia !~	<i>Prinia inornata</i>	Passeriformes	Cisticolidae
75	Purple Moorhen ~	<i>Porphyrio porphyrio</i>	Gruiformes	Rallidae
76	Purple Sunbird *~	<i>Nectarinia asiatica</i>	Passeriformes	Nectariniidae
77	Purple-Rumped Sunbird *!~	<i>Nectarinia zeylonica</i>	Passeriformes	Nectariniidae
78	Red Collard-Dove ~	<i>Streptopelia tranquebarica</i>	Columbiformes	Columbidae
79	Red Vented Bulbul *!~	<i>Pycnonotus cafer</i>	Passeriformes	Pycnonotidae
80	Red Whiskered Bulbul ~	<i>Pycnonotus jocosus</i>	Passeriformes	Pycnonotidae
81	Red-Rumped Swallow ~	<i>Hirundo daurica</i>	Passeriformes	Hirundinidae
82	Red-Wattled Lapwing *!~	<i>Vanellus indicus</i>	Charadriiformes	Charadriidae
83	Rose Ringed Parakeet *!~	<i>Psittacula krameri</i>	Psittaciformes	Psittaculidae
84	Rufous Tailed Lark *	<i>Ammomanes phoenicurus</i>	Passeriformes	Alaudidae
85	Shikra *~	<i>Accipiter badius</i>	Accipitriformes	Accipitridae
86	Singing Bush-Lark *~	<i>Mirafra cantillans</i>	Passeriformes	Alaudidae
87	Small Blue Kingfisher *!~	<i>Alcedo atthis</i>	Coraciiformes	Alcedinidae
88	Small green-billed malkoha *	<i>Phaenicophaeus viridirostris</i>	Cuculiformes	Cuculidae
89	Small Minivet ~	<i>Pericrocotus cinnamomeus</i>	Passeriformes	Corvidae
90	Spangled Drongo *	<i>Dicrurus bracteatus</i>	Passeriformes	Dicuridae
91	Spot-Billed Duck *!~	<i>Anas poecilorhyncha</i>	Anseriformes	Anatidae
92	Spotted Dove !~	<i>Streptopelia chinensis</i>	Columbiformes	Columbidae
93	Spotted Munia ~	<i>Lonchura punctulata</i>	Passeriformes	Estrildidae
94	Spotted Owlet ~	<i>Athene brama</i>	Strigiformes	Strigidae
95	Square-Tailed Drongo-Cuckoo *	<i>Surniculus lugubris</i>	Cuculiformes	Cuculidae
96	Steaked Fantail Warbler *~	<i>Zitting cisticola</i>	Passeriformes	Cisticolidae
97	Streaked Weaver ~	<i>Ploceus manyar</i>	Passeriformes	Ploceidae
98	Tickell's Flowerpecker *!~	<i>Dicaeum erythrorhynchos</i>	Passeriformes	Dicaeidae
99	Whistling Ducks *	<i>Anas arcuata</i>	Anseriformes	Anatidae
100	White Breasted Kingfisher *!~	<i>Halcyon smyrnensis</i>	Coraciiformes	Alcedinidae
101	White Breasted Waterhen *	<i>Amaurornis phoenicurus</i>	Gruiformes	Rallidae
102	White Rumped Shama *	<i>Copsychus malabaricus</i>	Passeriformes	Muscicapidae
103	White Stork *	<i>Ciconia ciconia</i>	Ciconiiformes	Ciconiidae
104	White-Bellied Drongo *	<i>Dicrurus caeruleus</i>	Passeriformes	Dicuridae
105	White-Throated Munia *	<i>Euodice malabarica</i>	Passeriformes	Estrildidae
106	Wire-Tailed Swallow *~	<i>Hirundo smithii</i>	Passeriformes	Hirundinidae
107	Yellow Billed Babbler *!	<i>Argya affinis</i>	Passeriformes	Leiothrichidae

Status:

* Monsoon Season

! Winter season

~ Summer Season