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Research Article

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Bird diversity in the Mount Dempo area, South Sumatra: An ecological resource for local-based biology learning

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ABSTRACT

Mount Dempo, South Sumatra, hosted a diverse range of bird species, making it a valuable ecological resource for local-based biology learning. This study aimed to document bird diversity in the region and to explore its potential for ecological education. The research was conducted in 2020 during the COVID-19 pandemic era. Data collection was carried out in the Mount Dempo area, limited to an altitude of approximately 2,086 meters above sea level at Shelter 1. The research employed the observation (point count) method along ecotourism routes by recording trails traversed using GPS. Sampling was conducted by walking along the path accompanied by predetermined observation points. The results recorded 21 bird species with a total of 96 individuals. The diversity analysis using the Shannon-Wiener Index produced a value of H' = 2.68, indicating moderate to high diversity, while the Simpson's Index (D = 0.092) suggested very low species dominance. Additionally, the Evenness Index (E = 0.88) reflected a relatively even distribution of individuals among species, highlighting ecological stability in the study area. The presence of various ecological niches and bird functional groups supported the development of environmental literacy and conservation awareness among students. Thus, integrating local bird diversity as a contextual learning resource was considered a strategic approach to enhance ecological understanding and foster pro-environmental behavior among learners.

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INTRODUCTION

Birds have a vital role in maintaining the balance of ecosystems. As pollinators, seed dispersers, pest regulators, and ecological indicators, they contribute significantly to ecosystem functionality and biodiversity health (Withaningsih et al., 2025). Their behaviors and population dynamics can signal environmental changes, making birds valuable bioindicators. Furthermore, their wide distribution, ease of

observation, and diverse ecological roles make them ideal subjects for both scientific study and environmental education. Globally, bird diversity is also a reflection of habitat complexity and ecosystem integrity. Regions with high bird species richness often correspond to high levels of other biodiversity as well. In tropical countries like Indonesia, birds not only play ecological roles but are also part of cultural and economic life (Suroso et al., 2023), like in the perspective of Dempo, South Sumatra communities. The combination of ecological significance and accessibility underscores the importance of birds in conservation and education efforts.

Mount Dempo, located in South Sumatra, Indonesia, is a notable mountainous region with high conservation value. The area is characterized by a mosaic of natural forest patches, agroforestry systems, and expansive tea plantations that date back to the colonial era. These diverse landscapes support a variety of flora and fauna, including birds that occupy different ecological niches. Their populations show how human activity, including tourism, may impact their habitats and the wider environment (Abdullah et al., 2024). During the COVID-19 pandemic, reduced human mobility led to temporary environmental changes, including quieter soundscapes and reduced disturbance to wildlife. Anecdotal observations suggested increased wildlife sightings near plantations and forest edges during lockdowns (Winarni et al., 2021). Systematic documentation of bird diversity in Mount Dempo remains scarce. Given its unique ecological setting and changing human pressures, Mount Dempo provides a valuable context for studying avian diversity and ecosystem dynamics in a montane agricultural interface.

Mountain regions are globally recognized as biodiversity hotspots due to their altitudinal variation, habitat heterogeneity, and climatic gradients. These factors create multiple ecological niches, supporting high levels of species richness, including many endemics (Kurnianto et al., 2025). In Indonesia, mountain ecosystems serve as important refugia for forest-dependent birds, especially in the face of deforestation in lowland areas. Birds in montane zones often exhibit distinct adaptations and migration patterns compared to their lowland counterparts. Studies from other Indonesian highlands have shown that elevation, habitat structure, and proximity to human-modified landscapes affect bird diversity patterns. Data on bird communities in South Sumatra's mountains, particularly in tea plantation-dominated areas like Mount Dempo, remain limited. Tea plantations play an important role as a transitional zone between natural habitats and urban areas, reducing the impact of urbanization and maintaining bird diversity in low-quality habitats (Wu et al., 2023). Understanding the composition and diversity of these communities is crucial for conservation planning and ecological assessment.

The results of field-based bird surveys can serve as meaningful resources for local-based biology learning. Integrating biodiversity data into biology education allows students to engage directly with their local environment and enhances their scientific inquiry skills (Rahmatan et al., 2022). Using real-time data from local ecosystems helps bridge the gap between textbook knowledge and experiential learning (Marianingsih et al., 2023). In the case of Mount Dempo, bird diversity data can be utilized to teach ecological concepts such as food webs, adaptation, habitat, and conservation. It also helps foster a sense of stewardship and place-based identity among students. Furthermore, such approaches align with current educational goals that emphasize contextual learning and environmental literacy. Bird diversity around Mount Dempo is not only of ecological interest but also of pedagogical value.

Studies on bird diversity in the mountainous regions of Sumatra have generally focused on broad inventories or habitat-specific assessments, while research specifically addressing avian diversity in the Gunung Dempo area remains very limited. Existing studies, where available, have largely been confined to tea plantation landscapes (Vivek et al., 2024), with limited attention to natural forest habitats and elevational gradients. Moreover, the findings of previous bird diversity studies in this region have not been

systematically integrated as reference materials for school-based environmental or biodiversity education, resulting in a missed opportunity to connect local ecological knowledge with formal learning contexts. Importantly, this study was conducted during the COVID-19 pandemic, a period marked by significant restrictions on human activities, including tourism, in the Gunung Dempo area. Reduced human presence and disturbance during this period are likely to have influenced bird occurrence and behavior, as documented in previous studies highlighting changes in wildlife activity under limited human mobility (Bates et al., 2020; Rutz et al., 2020). Therefore, this research fills a critical gap by documenting bird diversity under reduced anthropogenic pressure while also generating ecological data with potential applications for contextualized biodiversity education.

Based on these considerations, this study was conducted to assess the diversity of bird species in Mount Dempo and to evaluate its potential as a biological learning resource for local education contexts. The study addresses a research gap in terms of integrating field ecology with education, especially in the post-pandemic context. Previous research has largely focused on ecological inventories or teaching strategies in isolation, with limited attempts to bridge the two. The authors expect that the integration of local bird diversity findings from the Gunung Dempo area into biology learning materials can enhance students' understanding of biodiversity and foster awareness of conservation efforts rooted in local ecological knowledge (Armanda et al., 2024). Thus, this study aims to document bird diversity in the region and to explore its potential for ecological education.

RESEARCH METHODS

This research employed a mixed-method approach, combining quantitative ecological analysis and qualitative descriptive analysis. The quantitative component focused on assessing bird species diversity through field observation and biodiversity indices, while the qualitative component explored the potential integration of bird diversity as an ecological learning resource for local-based biology education. The study was conducted in June 2020, during the COVID-19 pandemic, at Mount Dempo, South Sumatra, Indonesia. Fieldwork was carried out over a 10-day survey period. Due to health-related restrictions, field data collection was limited to four main birdwatching areas, reaching up to Shelter 1, located at approximately 2,087 meters above sea level (asl). This elevation represents a transition zone between tea plantation landscapes and lower montane forest ecosystems. Bird observations were conducted twice daily, in the morning from 05:30 to 08:30 and from 15:30 to 18:30, to coincide with peak avian activity.

The research followed two main stages: 1) Field survey and biodiversity data collection, involving systematic observation and species recording, and 2) Educational mapping and analysis, aligning bird diversity data into a book of bird diversity on Dempo Mountain. The population of this study comprised all bird species found within the Mount Dempo ecosystem. The sample included bird species recorded along the designated observation trail up to Shelter 1, using purposive sampling based on accessibility and habitat representativeness. Each observed individual or species represented a sampling unit within the community structure. The study sites were divided into four survey areas, the locations of which are illustrated in the study area map (Figure 1).

The bird survey employed a combination of the Point Count Method and the Visual Encounter Survey (VES). Point Count Method: Observation stations were established along the trail, each with a fixed radius of 20 meters and an observation duration of 10 minutes per station. All birds seen or heard were recorded during each count. Visual Encounter Survey (VES): Conducted simultaneously by walking along the trail and visually searching for birds in the surrounding habitat, allowing detection of non-vocal or visually active species.

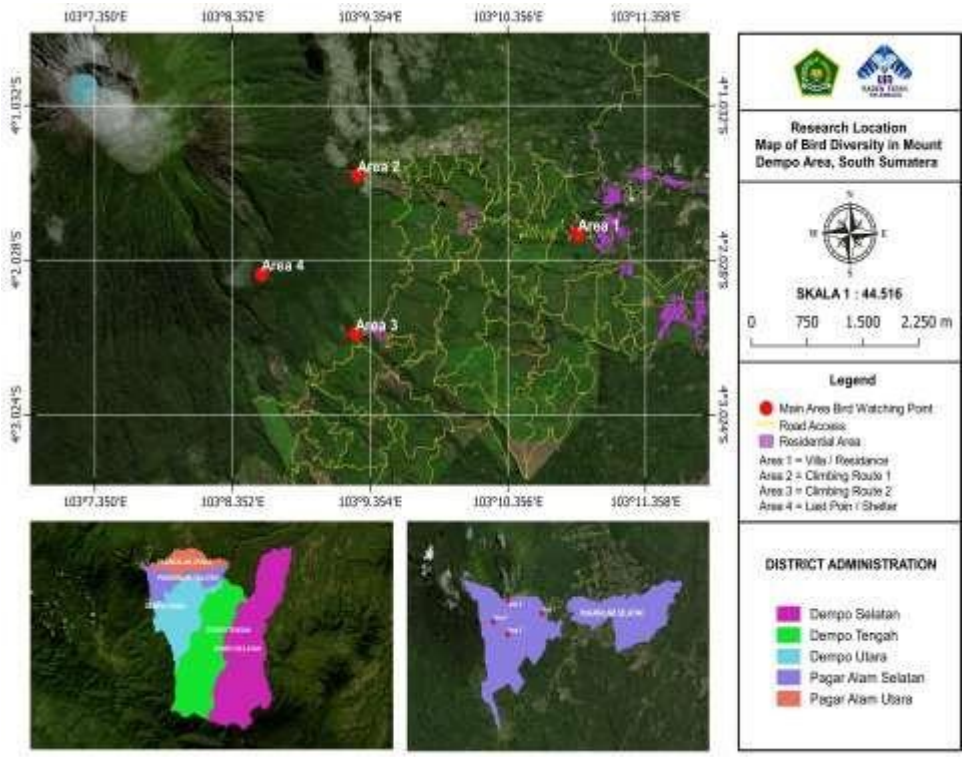

Figure 1. Map of Research Location in Mount Dempo Area, South Sumatra

Bird species were identified using binoculars and standard field guides. Observational data included the species name and the number of individuals encountered. The compiled data were analyzed using several biodiversity indices, including the Shannon-Wiener Diversity Index (H'), Simpson's Dominance Index (D), and Evenness Index (E) to evaluate species diversity, dominance, and community structure (Magurran, 2004). The equation and interpretation for each index are shown in the formula and table below. Shannon-Wiener diversity index interpretation can be seen in Table 1.

$$H' = -\sum(pi.\ln pi) \quad (1)$$

Table 1. Shannon-Wiener Diversity Index Interpretation

H' Value (Shannon)	Diversity Category	Ecological Interpretation
H' < 1	Low	Community dominated by 1–2 species, unstable habitat
1 ≤ H' < 2	Moderate	A few dominant species, but not evenly distributed
2 ≤ H' < 3.5	High	Many species with relatively balanced distribution
H' ≥ 3.5	Very High	Highly diverse and complex ecosystem, highly stable

$$D = \sum pi2 \quad (2)$$

Information about the formula (1) that H'=Shannon–Wiener diversity index, pi=Proportion of individuals belonging to the i-th species, calculated as pi ni / N, ni=Number of individuals of the i-th species, N=Total number of individuals of all species recorded, ln=Natural logarithm, and ∑=Summation of the values for all species observed. Information about the formula (2) that **D**=Simpson dominance index, pi=Proportion of individuals belonging to the *i*-th species, calculated as pi ni / N, ni=Number of individuals of the *i*-th species, N=Total number of individuals of all species recorded, and ∑=Summation

of the squared proportions of all species observed. Simpson dominance index (d) interpretation can be seen in Table 2. Information about the formula (3) that H'=Shannon-Wiener diversity index, S=Total number of species, and ln(S)=Natural logarithm of the species count. Evenness index (E) interpretation can be seen in Table 3.

Table 2 . Simpson Dominnance Index (D) Interpretation

D Value	Dominance Category	Ecological Interpretation
> 0.80	Very High	One or two species are highly dominant; the community is highly unbalanced
0.61 – 0.80	High	A few dominant species; overall species diversity is low
0.41 – 0.60	Moderate	The community is somewhat balanced; several species are more common
0.20 – 0.40	Low	Low dominance; relatively high species diversity
< 0.20	Very Low	No species dominates significantly; the community is highly diverse and well balanced

$$E = H'/\ln(S) \quad (3)$$

Table 3. Evenness Index (E) Interpretation

E-Value	Ecological Interpretation
E = 0	Highly uneven distribution; one species dominates
0 < E < 0.5	Uneven distribution of individuals
0.5 ≤ E < 0.75	Moderately even; most species are fairly balanced
E ≥ 0.75	Highly even distribution; stable and diverse ecosystem

Addressing the study's second focus, bird diversity as an ecological resource for locally based biology learning, a qualitative descriptive approach was employed. This approach involved mapping bird diversity findings (species richness, endemic and indicator species, and their ecological roles) against competencies in the Indonesian high school biology curriculum, specifically on biodiversity, ecosystem dynamics, and conservation education. The potential of bird diversity data as a learning material is presented in a booklet containing the results of the identification of bird species in the Mount Dempo area of South Sumatra.

FINDING AND DISCUSSION

Based on the research conducted, 21 bird species belonging to 18 families were directly observed in the study area. The bird families there are Accipitridae, Apodidae, Campephagidae, Capitonidae, Cuculidae, Columbidae, Cisticolidae, Dicruridae, Laniidae, Motacillidae, Muscicapidae, Nectariniidae, Passeridae, Pellorneidae, Pycnonotidae, Strigidae, and Sylviidae. Meanwhile, an additional 7 species were identified through interviews with local residents who had seen these birds firsthand, although the researchers did not encounter them during the field observations. The identification of bird species based on direct observations at the research site is shown in Table 4.

Table 4. List of Bird Species and Number of Individuals

No	Local Name	Famili	Species	Amount
1	Elang Paria	Accipitridae	*Milvus migrans*	1
2	Elang Rawa-Kelabu	Accipitridae	*Circus cyaneus*	1
3	Punai Gagak	Columbidae	*Treron sphenura etorques*	2
4	Apung Tanah	Motacillidae	*Anthus cervinus*	4
5	Bubut	Cuculidae	*Centropus sinesis*	2

No	Local Name	Famili	Species	Amount
6	Kolibri Hitam	Nectariniidae	*Leptocoma aspasia*	1
7	Sikatan	Muscicapidae	*Muscicapa sibirica*	4
8	Srigunting Sumatra	Dicruridae	*Dicrurus sumantranus*	2
9	Prenjak Gunung	Cisticolidae	*Prinia artogularis*	6
10	Takur	Capitonidae	*Megalaima oorti*	1
11	Gereja	Passeridae	*Passer domesticus*	16
12	Walet Palem Asia	Apodidae	*Cypsiurus balasiensis*	7
13	Merpati Hias	Columbidae	*Columba livia domestica*	4
14	Merpati Batu	Columbidae	*Columba livia*	3
15	Pergam Putih	Columbidae	*Docula luctusa*	3
16	Kutilang	Pycnonotidae	*Pycnonotus aurigaster*	17
17	Kapasan	Campephagidae	*Lalage nigra*	4
18	Pentet	Laniidae	*Lanius schach*	9
19	Cinenen Gunung	Sylviidae	*Orthotomus cuculatus*	3
20	Beluk Watu Gunung	Strigidae	*Glaucidum brodiei*	1
21	Berencet	Pellorneidae	*Napothera epilepidota*	5

Based on Table 4, a total of 96 individual birds representing 21 different species were recorded at the research site. The species identification was conducted based on several ornithological field guides, including the bird identification handbook for Sumatra, Java, Bali, and Kalimantan (MacKinnon et al., 2010), the handbook of Sumatra agroforest birds (Ayat, 2011), handbook of bird on sembilang dangku area (Mulyani et al., 2020). There are an additional seven bird species reported to inhabit the study area based on interviews with local residents. However, these species are not included in the table above due to the lack of direct observation and proper identification by the researchers. Accurate identification requires morphological characteristics, audio recordings of bird calls, or direct visual confirmation of the bird's presence (Nugroho et al., 2023).

The total number of birds found in this study was 96 individuals. The birds found in this study varied in distribution, not all species of the same species were found at a single location, but rather at several locations. This is due to temperature fluctuations and the birds' different daily activities in fulfilling their daily food needs, reproduction, and self-defense, so it is very possible for the same type of bird to be found in several different locations. For instance, fluctuations in daily or seasonal temperatures can impact activity patterns,reproduction, and survival rates. For the sampel some birds suggests that soil acidity or alkalinity significantly affected their distribution. Changes in soil pH, whether due to natural or anthropogenic factors, can alter habitat suitability for this species (Kurnianto et al., 2025).

The distribution of bird species listed in Table 4 is found in different locations based on altitude. This research has 4 main area bird watching, and each main area has several observation points with different height levels. The research site, which is also dominated by tea plantation areas, is naturally located in a highland area. The factors of tea plantations, especially the vegetation structure, had a strong influence on the abundance of the birds. Nature-dependent birds preferred to occur in tea plantations with perennial herbs, while urban-dependent birds were attracted by the generally distributed plants, such as annual herbs (Wu et al., 2023). Therefore, each main bird monitoring area has a different elevation and altitude. The altitude of a location influences the types of birds found there, as different altitudes also lead to different types of vegetation and birds (Imboma et al., 2020). The distribution of bird species based on altitude at the research location can be seen in Figure 2.

Based on Figure 2, the location where the lowest bird was found was at an altitude of 1020 m above sea level (asl), and the location at the highest point of the area was at an altitude of 2086 m above sea level (asl). The dominance of birds such as *Treron sphenura etorques, Anthus cervinus, Centropus sinesis, Leptocoma aspasia, Muscicapa sibirica, Dicrurus sumantranus, Prinia artogularis, and Megalaima oorti* are sightings were at an altitude of 1.600 to 1,650 meters above sea level (asl), an area dominated by tea plantations. The area of tea plantations has great potential in harbouring and conserving birds and other associated life forms (Chettri et al., 2018). Tea plantations also provide conditions where birds can meet their daily needs while carrying out their daily activities, but they are not used as nesting grounds. On the other side, tea plantations can provide resources for forest-associated birds, but the effectiveness of preserving avian diversity depends on natural forest fragments and can be enhanced by landscape-scale management, when the biocontrol potential of birds can also be enhanced (Siddiq et al., 2025).

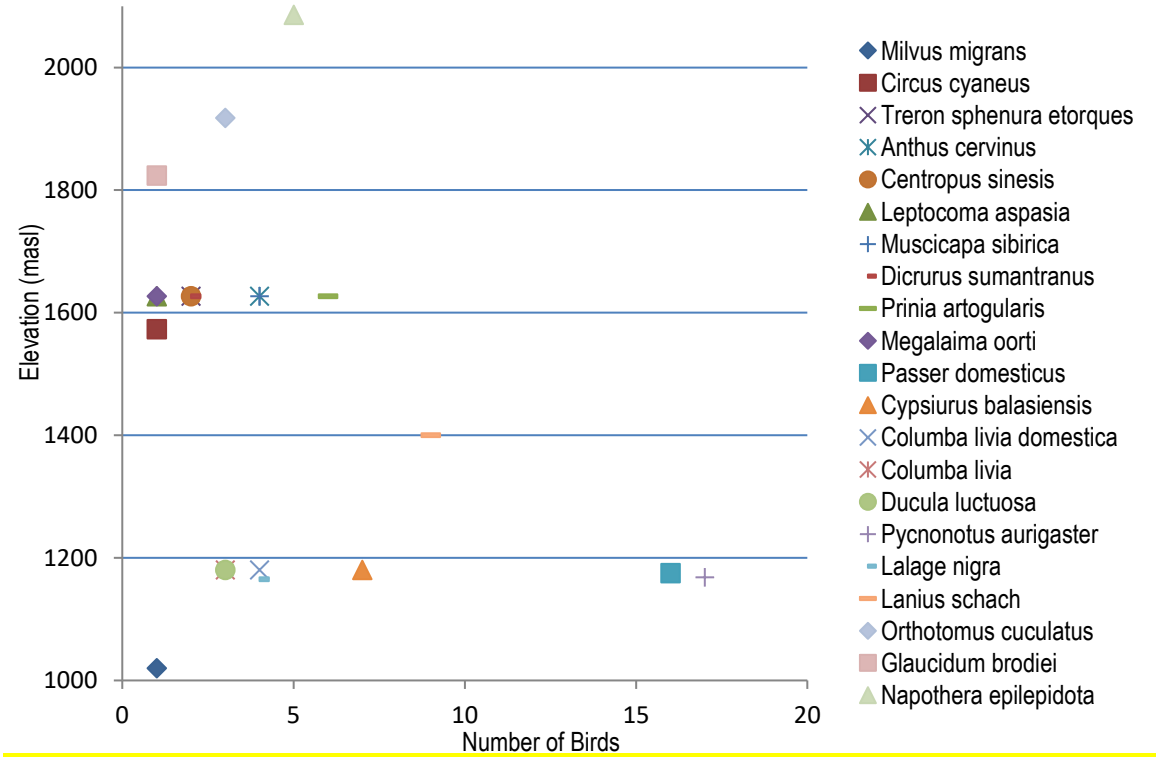

Figure 2. Bird Distribution Based on Elevation and Number of Species

Based on Figure 2, the location where the lowest bird was found was at an altitude of 1020 m above sea level (asl), and the location at the highest point of the area was at an altitude of 2086 m above sea level (asl). The dominance of birds such as Treron sphenura etorques, Anthus cervinus, Centropus sinesis, Leptocoma aspasia, Muscicapa sibirica, Dicrurus sumantranus, Prinia artogularis, and Megalaima oorti are sightings were at an altitude of 1.600 to 1,650 meters above sea level (asl), an area dominated by tea plantations. The area of tea plantations has great potential in harbouring and conserving birds and other associated life forms (Chettri et al., 2018). Tea plantations also provide conditions where birds can meet their daily needs while carrying out their daily activities, but they are not used as nesting grounds. On the other side, tea plantations can provide resources for forest-associated birds, but the effectiveness of preserving avian diversity depends on natural forest fragments and can be enhanced by

landscape-scale management, when the biocontrol potential of birds can also be enhanced (Siddiq et al., 2025).

Data from bird observationsin this research found 21 species, with 18 families, and approximately 96 individuals. The data reaches on the different site bird watching locations, there are 4 main areas in this research. The 4 main area including one of the residance area, two mount dempo climbing area, and one mount dempo area limited on shelter 1 area. Data on individual numbers on the research location site can determine the diversity, dominance, and evenness of the birds. The numbers about diversity index, dominance index, and evenness index are show on the Table 5 below.

Table 5. Numbers of Diversity Index, Dominance Index, and Evenness Index

Parameter	Amount	Category
Diversity Index	2.68	High Diversity
Dominance Index	0.092	Very Low Dominance
Eveness Index	0.88	High Even Distribution

Based on Table 5, the diversity index of birds in the research site, 2.68, is in the category of high diversity. The diversity conditions that are categorized as high can be influenced by many factors, such as environmental factors that allow many birds to be found active at the research location, and the number of individuals, which is a determining factor in the bird community found at the location. The ecological interpretation that can be seen in the high level of diversity in this study is that the community is quite diverse, species are distributed relatively evenly, so that they can influence the level of dominance of a species in the research location. Another factor contributing to the high bird diversity index in this study is that observations were conducted during the COVID-19 pandemic, when human activity around the conservation area was restricted, allowing birds to comfortably carry out their daily activities, which impacted the number of birds present at the site. Increased ecotourism activity can negatively impact the overall bird diversity in an area (Abdullah et al., 2024).

The bird dominance index in this study was 0.092, where this number indicates a very low level of bird dominance at the study site. This amount has an ecological interpretation, indicating that no single species significantly dominates, resulting in a highly diverse and stable community. The site area was divided into three main bird monitoring areas, meaning that each bird found in each vegetation area had a distinct species. Area one, which is a villa and residential area, has distinct vegetation from areas two and three, which are tea plantations, and area four, which is part of Mount Dempo. Different types of vegetation provide different types of food for birds to consume, which will affect the types of birds present in each type of vegetation. The dominance of that species causes feeding ground conditions to become more closed (Siddiq et al., 2025). The dominance of certain species can reflect more specific and less varied environmental conditions, and show symptoms of imbalance, such as the emergence of different communities due to differences in food types (Kurnianto et al., 2022).

The evenness index in this study was 0.88, which is in the category of high even distribution. This amount has an ecological interpretation indicating that the condition shown the stable and diverse ecosystem. The evenness index describes the variability in species abundances. A community in which all species have approximately equal numbers of individuals (similar biomasses) would be rated as extremely even. Conversely, a large disparity in the relative abundances of species would result in the descriptor being uneven (Magurran, 2004). In this study, the number of bird species found, amounting to 96 individuals, was greatly influenced by the limited research time due to restrictions on visits to the research location and the impact of restrictions on interactions during the pandemic. This number then

influences the evenness index in this study, so that the evenness index figure in this study is in the category high even distribution.

The relatively high evenness and species diversity observed in the Mount Dempo area indicate not only ecological stability but also strong potential for contextual learning. Accordingly, the bird diversity findings were qualitatively mapped to core concepts and learning competencies in the Indonesian senior high school biology curriculum. This mapping illustrates how local bird diversity can be meaningfully integrated into biology learning, particularly in topics related to biodiversity, ecosystem dynamics, and conservation education. Alignment of bird diversity findings with senior high school biology topics can be seen in Table 6.

Table 6. Alignment of Bird Diversity Findings with Senior High School Biology Topics

Bird Diversity Findings	Ecological Interpretation Based on This Study	Examples of Observed Characteristics	Biology Learning Topics	Learning Competencies
High species richness within the observation area	Indicates diverse bird assemblages in the transition zone between tea plantations and lower montane forest ecosystems	Variation in morphology, habitat use, and feeding behavior among recorded species	Biodiversity and levels of biodiversity	Students can identify and explain biodiversity at the species level using local examples
Presence of forest and semi-forest associated birds	Reflects habitat quality and relatively low ecological dominance within the observed elevation range	Insectivorous and frugivorous bird groups	Ecosystem dynamics and organism–environment interactions	Students can analyze relationships between organisms and their environment
Ecological roles of birds in ecosystem processes	Birds contribute to ecological balance through seed dispersal and insect population control	Feeding guilds (frugivores, insectivores)	Ecology and food web concepts	Students can explain the ecological roles of organisms in maintaining ecosystem stability
Bird diversity under limited human activity conditions	Reduced human disturbance during the COVID-19 pandemic increased bird presence and detectability	Increased encounter rates in less disturbed areas	Environmental change and ecosystem balance	Students can relate environmental changes to biological responses
Local biodiversity potential of Mount Dempo	Bird diversity represents local biological resources	Bird species observed in Mount Dempo	Conservation biology and biodiversity conservation	Students develop conservation awareness based on local biodiversity

Table 6 above demonstrates that bird diversity findings from the Mount Dempo area can be systematically linked to senior high school biology learning topics. High species richness provides concrete examples for teaching biodiversity at the species level, which is a fundamental concept in biology education (Bermudez & Lindemann-matthies, 2020; Yli-panula et al., 2018). Additionally, the presence of birds associated with forest and semi-forest habitats supports students' understanding of ecosystem dynamics and organism-environment interactions, particularly in transitional ecosystems.

The identified ecological roles of birds, such as insect population regulation and seed dispersal, further strengthen the application of these findings for explaining food web structure and ecosystem balance. Moreover, observations conducted during a period of reduced human activity highlight how

environmental disturbances influence biological communities, offering relevant contexts for conservation education. Importantly, all educational interpretations in Table 6 are constrained to the empirical findings of this study and limited to the elevation range up to 2,087 m asl, ensuring that the pedagogical use of bird diversity does not exceed the ecological scope of the research. The use of locally observed biodiversity as a learning resource aligns with contextual and experiential learning approaches that enhance students' ecological understanding and environmental awareness (Cano-ortiz et al., 2025).

The numbers generated in this study indicate a high level of bird species diversity in the Mount Dempo area of South Sumatra. The results are considered highly suitable for use as learning materials in biology courses based on local biodiversity potential. The results of this research are then presented in the form of a book as learning material for students, so that bird diversity can be implemented for biology learning materials such as levels and classification of biodiversity, threats to biodiversity, and conservation efforts (Marianingsih et al., 2023). The layout book of birds in the Mount Dempo area can be seen in Figure 3.

Figure 3. The Layout Book of Birds in the Mount Dempo Area

The booklet of bird species developed from this study was based on empirical findings of avian diversity in the Mount Dempo area, South Sumatra. By utilizing a local biodiversity approach, students are expected to recognize and appreciate the richness of bird species in their surrounding environment. Similar initiatives integrating local biodiversity data into learning resources have proven effective in enhancing students' ecological literacy and scientific inquiry skills (Kumalasari et al., 2023), and can

provide direct understanding to students through the context of blended learning, which is currently often applied in the context of local biodiversity, can increase students understanding the importance of bioconservation (Rahmatan et al., 2022). Environmental awareness and nature conservation can be expected to encourage students to act in an environmentally friendly manner and avoid damaging the ecosystems around them (Leksono et al., 2021).

The integration of bird diversity data from Mount Dempo into educational materials aligns with current pedagogical trends emphasizing contextual and experiential learning. This approach not only supports curriculum goals in biodiversity and ecosystem dynamics but also serves as an instrument to strengthen place-based education. Compared to similar research conducted in other Indonesian montane ecosystems, such as in Meru Batiri National Park (Kurnianto et al., 2022). The results from Mount Dempo reinforce the consistent pattern that mountain habitats provide significant educational potential through their rich ecological complexity and accessibility for field-based learning.

Ultimately, this study highlights that linking biodiversity research with education can create a synergistic model for both conservation and pedagogy. Future research should expand sampling across higher elevations and different habitat types to gain a more comprehensive understanding of avian community dynamics in Mount Dempo. Moreover, further development of digital or interactive learning media based on local biodiversity could enhance students' engagement and long-term environmental stewardship.

CONCLUSION

This study recorded 21 bird species belonging to 18 families, with a total of 96 individuals distributed across an altitudinal range from 1,020 to 2,086 m above sea level in the Mount Dempo area. The Shannon-Wiener diversity index (H' = 2.68) indicates a high level of bird species diversity, suggesting that the study area supports a structurally complex and ecologically stable avian community. The low Simpson's dominance index (D = 0.092) reflects the absence of a single dominant species, indicating balanced resource use and minimal ecological pressure from competitive exclusion. Furthermore, the high evenness value (E = 0.88) suggests that individuals were relatively evenly distributed among species, a pattern commonly associated with well-preserved habitats. These ecological characteristics may be linked to reduced human activity during the COVID-19 pandemic, which potentially lowered disturbance levels in this tourism-prone area and allowed bird communities to occupy available habitats more evenly. In addition to its ecological significance, the documentation of local bird diversity was compiled into an educational book, providing context-based learning material that supports biodiversity awareness and conservation education grounded in local ecological conditions.

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