A Comparison of Bird Diversity in Natural forest area and an Urban area

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Abstract

A survey of bird diversity was conducted across a natural forest area (Agricultural Innovation Demonstration and Training Center, Chiang Mai University) and an urban area (Ang Kaew Reservoir, Chiang Mai University) over a four-month period from August to November 2025. Utilizing the Line Transect method over a distance of 500 meters, the study identified a total of 52 bird species from 28 families, comprising 48 resident species and 4 migratory species. The results indicated that the natural forest area possessed the highest species diversity (Shannon Index, *H'*) at 3.25, while the urban area recorded a lower value of 3.23. Conversely, in terms of species richness (S), the urban area reached a maximum of 7.49 compared to 7.38 in the forest area, reflecting an exceptionally high level of biodiversity. Despite these environmental differences, both locations exhibited an identical evenness index of 0.9, suggesting that the distribution of individuals across species remains remarkably consistent between the two habitats. Furthermore, the species similarity was found to be at a moderate level, with a Similarity Index of 0.45, reflecting differences in species composition between the natural forest and the urban environment.

Introduction

Birds serve as vital environmental indicators and play a crucial role in maintaining ecosystem balance. However, rapid urbanization significantly impacts their natural habitats and foraging behaviors. This study aims to compare bird diversity between a natural forest area (Agricultural Innovation Research, Integration, Demonstration and Training Center, Chiang Mai University.) and an urban area (Ang Kaew reservoir) at Chiang Mai University. The findings intend to provide essential data for urban green space management to promote sustainable biodiversity.

Materials & Methods



Natural forest Area

01. Experimental design
utilized a comparative design, selecting the two contrasting areas.



Urban Area



Agricultural Innovation Demonstration and Training Center, Chiang Mai University

02.Line transect surveys
Using the Line Transect Method over a distance of 500 meters. This transect was segmented into 10 sampling points.



Ang Kaew Reservoir

12h /area/month
(Aug - Nov 2025)

03. Data collection
Data will be used to calculate the avian species diversity index.

- Shanon Index (*H'*)
- Evenness
- Species Richness
- Similarity Index

Results & Discussion

	Natural Forest Area	Urban Area
Total Species	35	36
Shannon Index (H')	3.25	3.23
Evenness	0.91	0.90
Species Richness	7.38	7.49

Table 1. Table of Biodiversity Indices Comparison between Natural Forest and Urban Areas

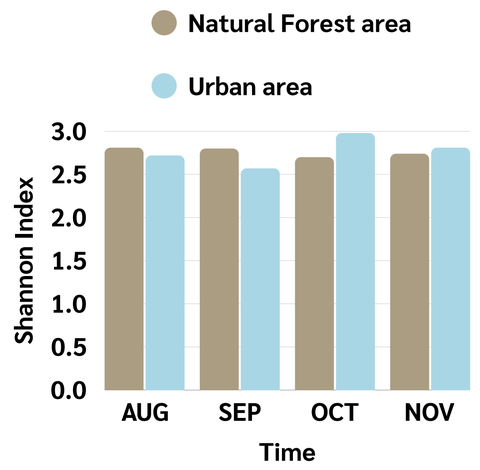


Fig 1. Compared Shannon index between Urban area and Natural forest area (Aug–Nov 2025)

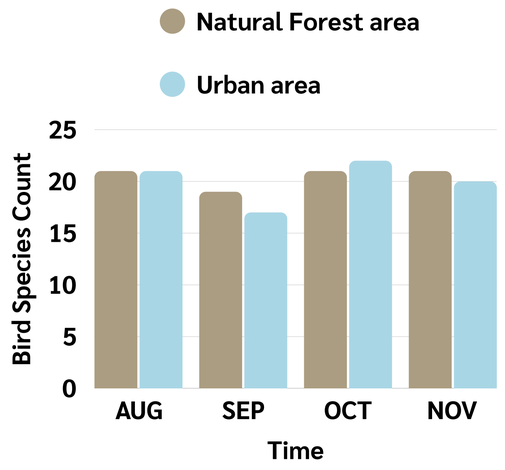


Fig 2. Compared Bird Species Count between Urban area and Natural forest area (Aug–Nov 2025)

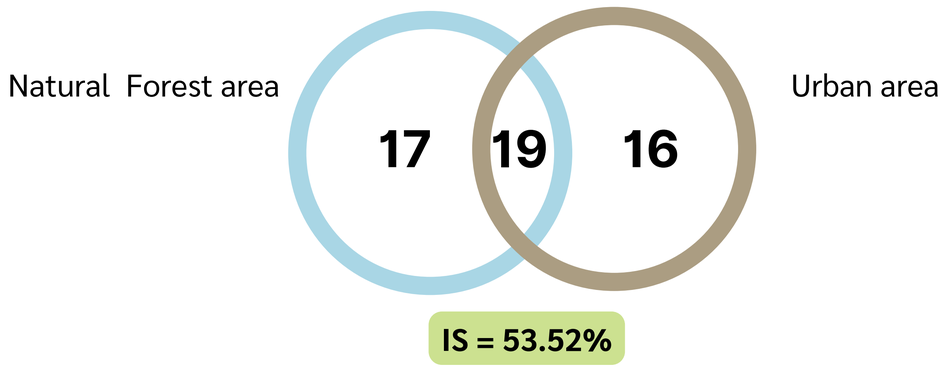


Fig 3. Venn diagram showing bird species similarity and overlap between the Natural Forest area and the Urban area.

Conclusion

A comparative analysis of biodiversity indices reveals that both Natural Forest and Urban Areas maintain high ecological health. The Natural Forest shows slightly higher stability with a Shannon Index (H') of 3.25 and an Evenness of 0.91, indicating a more balanced species distribution.

In contrast, the Urban Area surprisingly recorded a higher Total Species (36) and Species Richness (7.49) compared to the forest's 35 and 7.38. This suggests that while the forest is more balanced, the urban environment supports a slightly wider variety of species. Overall, the data demonstrates that the urban area is remarkably diverse, nearly matching the ecological value of the natural forest.

Acknowledgement

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References

Pramono, H., et al. (2021). Bird Community Structure in Urban and Forest Habitats. Biodiversitas, 22(9), 3788-3789.