JPPIPA 12(5) (2026)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Vegetation Diversity Supporting the Activities of Cenderawasih Birds (*Paradisaeidae*) in the Tablasupa Village Forest, Depapre District, Papua

Katrina Sada[1], Alfred Alfonso Antoh[1*], Edoward Krisson Raunsay[1]

[1] Biology Education Study Program, Universitas Cenderawasih, Jayapura, Indonesia.

Received: January 16, 2026
Revised: April 26, 2026
Accepted: May 25, 2026
Published: May 31, 2026

Corresponding Author:
Alfred Alfonso Antoh
alfred.antoh@gmail.com

DOI: 10.29303/jppipa.v12i5.15008

Abstract: This limited knowledge has the potential to hamper community-based conservation efforts, as effective habitat protection requires a detailed understanding of the vegetation types that support the entire life cycle of the animal. Therefore, focused research is needed to map the types of vegetation or trees that primarily support the activities of the Cenderawasih birds in the Tablasupa Village forest. This research method uses quantitative and qualitative descriptive methods using exploratory survey techniques. Study aims to describe the habitat of the Cenderawasih bird (family Paradisaeidae) in the forest of Tablasupa Village, Depapre District, Jayapura Regency, Papua. Identifying the tree species used by the bird in carrying out its activities. The Cenderawasih bird is an endemic animal of Papua that has high ecological, aesthetic, and cultural value. Data collection was carried out at predetermined observation spots at the research location, with the methods used including direct observation, exploration, and literature study. The data obtained were analyzed using qualitative descriptive analysis. This study shows that there are certain trees that can be used by the Cenderawasih bird to carry out its activities. Eleven tree species are used by the Cenderawasih bird for various activities, namely seven tree species as play areas, three species as food trees, and one tree species as a bed for the Cenderawasih bird. The presence of certain tree species greatly influences the survival and activities of the Cenderawasih bird.

Keywords: Bird of Paradise; Forest; Habitat; Tablasupa

Introduction

Indonesia is known as a megabiodiversity country with a rich diversity of flora and fauna. This richness includes approximately 20,000 species of flowering plants (angiosperms), of which 40% are endemic (Sun et al., 2024). Furthermore, Indonesia's mosses comprise more than 10% of the world's species. In terms of fauna, Indonesia is home to 17% of the world's bird species (1.711 species), 9% of the world's freshwater fish species (1.236 species), 12% of mammal species, 16% of reptile species, and ranks sixth in the world for the number of amphibian species. As a country located on the equator, birds are a crucial component of Indonesia's ecosystem, playing a crucial role in supporting the life cycle of organisms (Raunsay et al., 2025; Rajpar, 2018). Birds are easily found in every type of habitat (Tu et al., 2020; Tan et al., 2024). One of the primary habitats for birds to move and play is trees (Dahdouh-Guebas et al., 2021; Yeny et al., 2022). Trees, as habitats for certain animals, are an integral part of life due to their vital role in the survival of birds, including the Bird of Paradise (Butchart et al., 2025; Vaccaro et al., 2022). Birds of Paradise are highly dependent on trees for play, nesting, mating, courtship, and foraging (Raunsay et al., 2024; Raunsay, 2020).

The current state of bird conservation in Indonesia presents significant challenges. Although the number of recorded bird species increased to 1.794 in 2020—making Indonesia the fourth-largest country in the world for bird species—this increase is also accompanied by a rise in the number of endangered

How to Cite:
Sada, K., Antoh, A. A., & Raunsay, E. K. (2026). Vegetation Diversity Supporting the Activities of Cenderawasih Birds (Paradisaeidae) in the Tablasupa Village Forest, Depapre District, Papua. *Jurnal Penelitian Pendidikan IPA*, *12*(5), 34–41. https://doi.org/10.29303/jppipa.v12i5.15008

species. A total of 244 bird species are listed as threatened with extinction, with 30 classified as critically endangered, 48 as endangered, and 96 as vulnerable (Wahle et al., 2025; Develey, 2021). Papua, as a region in Eastern Indonesia, holds a strategic role because it harbors approximately half of Indonesia's total biodiversity, including 650 bird species. The bird endemism rate in Papua reaches 52%, the highest in Indonesia (Li et al., 2021). The most exotic icon of Papua's biodiversity is the Bird of Paradise (Family Paradisaeidae), which comprises 14 genera and 43 species. Most of these species inhabit tropical rainforests from the lowlands to elevations of 3.500 meters above sea level. Of the 43 identified species, 27 are found in Papua (Panda et al., 2021; Albalawi, 2025). Unfortunately, the beauty of their feathers and striking colors makes these birds frequently hunted. Various human activities such as deforestation, shifting cultivation, and poaching, coupled with a lack of intensive management, have triggered population declines and the destruction of habitats essential for the survival of these animals (Chen et al., 2024; Kindlmann et al., 2025).

One potential area for bird-of-paradise observation is Tablasupa Village, Depapre District, Jayapura Regency. As a tourist village, Tablasupa boasts three bird-of-paradise observation spots, which are iconic for Papua Province. However, the area's popularity as an ecotourism destination has not been matched by in-depth research into the ecology of its habitat. Research at this location is urgently needed to obtain detailed information on the types of trees used by the birds-of-paradise for various activities and to identify the factors influencing these activities to support forest conservation and habitat sustainability (Rajpar et al., 2021; Gonçalves-Souza et al., 2020). Based on initial observations in Tablasupa Village, local residents generally only know the types of trees used for feeding and playing, while the specific trees used for mating, nesting, and resting are still unknown. Although local communities are beginning to recognize the importance of environmental protection, there remains a gap in understanding regarding the ecological contribution of habitat research.

Challenges such as limited access to information and prioritizing economic and health needs are factors that hinder public awareness of comprehensive habitat conservation. Therefore, increasing knowledge and awareness through research focused on the activities of Cenderawasih birds in the Tablasupa Village forests area is crucial. Based on this background, this study aims to identify the types of vegetation or trees that play a key role in supporting Cenderawasih bird activities (feeding, playing, mating, nesting, and resting) and to analyze the level of biodiversity (biodiversity index) of trees involved in these activities in the Tablasupa Village forests, Depapre District, Jayapura Regency.

Method

This research method uses quantitative and qualitative descriptive methods using exploratory survey techniques. Specifically, in the field of forest ecology, this method is often referred to as the transect method, combined with ethnozoological interviews (local knowledge). The use of PAST software demonstrates a statistical analysis of biodiversity, while interviews and narratives provide a qualitative dimension. This research was conducted from April to May 2025 in Tablasupa Village, Depapre District, Jayapura Regency, Papua.

Figure 1. Map of the location of the Cenderawasih bird in Tablasupa Village, Depapre District, Jayapura Regency

Population and Sample

Population

The population used in this study was all tree species found in the forest area of Tablasupa Village, and the residents of Tablasupa Village, Depapre District, Jayapura Regency, Papua.

Sample

The sample in this study was all tree species used as habitats for Cenderawasih birds, such as playing, nesting, mating, and other activities, as well as members of the community who know the habitat of Cenderawasih birds in the forest area of Tablasupa Village, Depapre District, Jayapura Regency, Papua.

Tools and Materials

The tools required for this study are presented in the following table 1.

Table 1. Tools and Materials for Bird of Paradise Research

Research Tools and Materials	Function (Description)
Digital Camera	To record images and videos in digital format
Stationery	Used to record research results
Mobile Phone	As a documentation tool
Machetes	Used for cutting
Rolling Meter	Used to measure length, distance, width, height, and depth
GPS	To determine position, speed, and time
Binoculars/Telescope	Used to magnify distant objects
Birds of New Guinea Observation Guidebook	Used as a guide for observing, measuring, and recording
Tally Sheet	Used to collect data, calculate, and record the frequency of events
Bird of Paradise	Used as an object of study in research

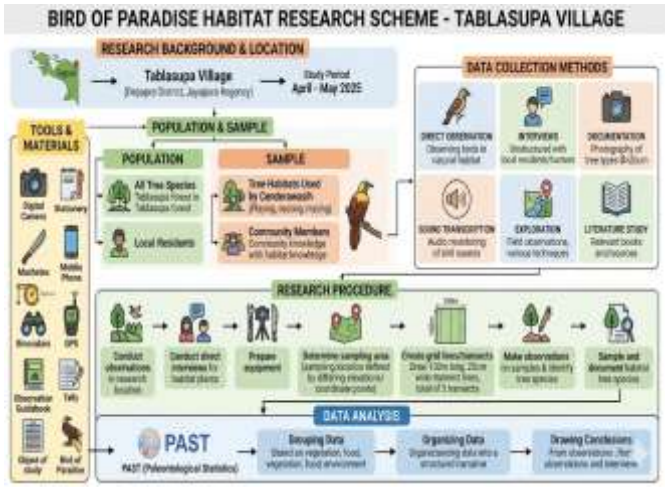

Figure 2. Research scheme

Data Collection Methods

Data was collected through several methods, including:

Direct Observation

The study conducted direct observations of Cenderawasih birds in their natural habitat in Tablasupa Village, Depapre District, Jayapura Regency, Papua.

Interviews with Local Residents

Interviews with local residents or bird hunters familiar with Cenderawasih bird habitat can provide additional information on migration patterns, bird behavior, and habitat changes over time. The type of interviews used was unstructured.

Documentation

Documentation was conducted through direct photography of the types of trees (Ø > 20 cm) used by Cenderawasih birds as their activity or habitat in each plot at the research site.

Sound Transcription (Audio Monitoring)

Recording the sounds of Cenderawasih birds can help identify their locations. For example, when Cenderawasih birds come to play in the trees, recording their sounds makes it easier to identify which trees the Cenderawasih birds use for their activities.

Exploration

This study aims to explore and understand in-depth the habitat, distribution, and activities of birds of paradise in relation to trees (Ø > 20 cm) and the vegetation around their habitat. The methods used will involve direct field observations and data collection using various techniques.

Literature Study

This study will utilize books and other sources relevant to the research topic.

Research Procedure

Conduct observations at the research location; Conduct direct interviews with local residents to understand the types of plants that birds of paradise use as habitats; Prepare all necessary equipment at the research site; 4. Determine the area to be used for sampling; The sampling location is located in the Tablasupa Village forests. The sampling area is defined by delimiting areas with different elevations from different coordinate points; Next, at the boundary area, a grid line is created by drawing a 100-meter-long, 20-cm-wide transect line, with a total of 3 transects. This can be seen on the transect plan.

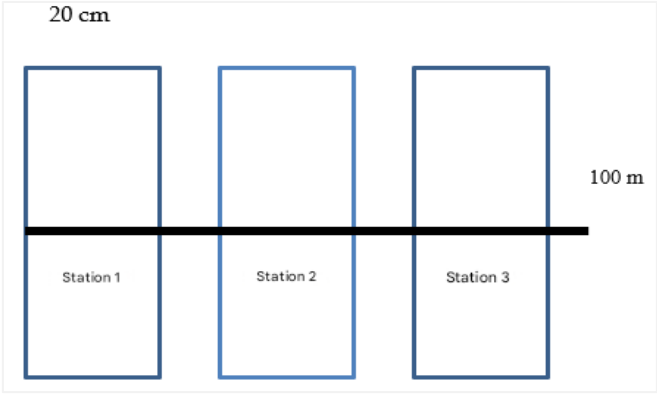

Figure 3. Bird-of-paradise sampling transect

Next, observations were made on the samples and the identification of tree species that could be used as

habitats for the birds. Sampling and documentation of tree species used by the birds as habitats were carried out.

Data Analysis

Data were analyzed using PAST (Paleontological Statistics) software and analyzed descriptively and qualitatively, with the following steps: Grouping data based on vegetation type, food availability, and environmental conditions; Organizing data into a structured narrative; Drawing conclusions from observations and interviews.

Result and Discussion

Vegetation as Play Trees

The study identified seven tree species from seven different families that are ecologically linked to the play behavior (lekking) of Cenderawasih birds. The species found included Litsea tuberculata, Elaeocarpus spaericus, Calophyllum inophyllum, Buchanania sp., Prunus sp., Palaquium sp., and Aglaia argentea. Visually, a comparison of species richness between transects showed that Transect III had the highest speciation rate and the most even distribution of individuals compared to the other transects.

Table 2. Vegetation as Play Trees of Cenderawasih Birds

Family	Indonesian Name	Local Name	Species
Lauraceae	Medang	Naro	*Litsea tuberculata*
Eleocarpaceae	Ganitri	Mare-mare	*Elaeocarpus spaericus*
Calophyllaceae	Bitangur	Temai	*Calophyllum inophyllum*
Anacardiaceae	Popohan	Kori kori	*Buchanania* sp
Rosaceae	Ceri hutan	Sisiro	*Prunus* sp
Sapotaceae	Pala hutan	Nyatuh	*Palaquium* sp
Meliaceae	Langsat hutan	Suangteka dere	*Aglaia argentea*

Vegetation as Food Trees

Birds of Paradise rely heavily on local flora such as Knema tomentela, Pticoperma macarturri, and Pandanus sp. as their primary energy source. Knema tomentela, a member of the nutmeg family, produces nutrient-rich seeds, while Pticoperma macarturri provides small, easily digestible fruits year-round. Biodiversity analysis showed that Transect III was the most stable and heterogeneous area, while Transect I had the highest abundance of individuals but was dominated by a specific species.

Table 3. Vegetation as Food Trees for Birds of Paradise

Family	Indonesian Name	Local Name	Species
Myristicaceae	Kemiri hutan	Ekesiai-siai	*Knema tomentela*
Arecaceae	Palem		*Pticoperma macarturri*
Pandanaceae	Pandan	Nyatuh	*Pandanus* sp

Vegetation as a Sleeping Tree

The sleeping tree is a very specific and limited habitat resource, with only one identified species, Pouteria sp. (family Sapotaceae). This tree was chosen because of its sturdy trunk structure, dense canopy, and strong branches, which provide protection for birds from predators and extreme weather conditions during their resting phase (diurnal to nocturnal). However, the existence of this tree is threatened by deforestation, habitat fragmentation, and climate change, which disrupt the reproductive cycle of this vegetation.

Table 4. Vegetation as a Sleeping Tree

Family	Indonesian Name	Local Name	Species
Sapotaceae	Sawo	Enkutu	*Pouteria* sp

Table 5. Factors Influencing Sleeping Tree Choice

Factors	Influence on sleeping/nesting tree choice
Tree height and diameter	The taller and larger, the more preferred
Branch structure	Flat and wide branches are ideal for nesting
Canopy density	Denseer and safer from predators
Human disturbance	Birds avoid locations near human activity
Presence of other birds	Certain bird species avoid each other for sleeping/nesting

Vegetation Supporting Bird-of-Paradise Activity
Trees and Play (Lekking)

Birds-of-Paradise use specific trees as lek sites (dance and vocal display areas) to attract mates. These sites generally have specific characteristics such as tall trees, horizontal branching, and open areas (Liepiņa et al., 2024). Identified tree species include: Litsea tuberculata: Has an open crown and small fruits favored by frugivorous birds (Yang et al., 2025). Elaeocarpus sphaericus: Has a horizontal branch structure that supports the dance arenas of Parotia sefilata and Parotia lawesii species; Palaquium sp.: Has high potential as a play tree for upper canopy species such as Paradisaea minor and Paradisaea apoda (Lin et al., 2024); Other species: Aglaia argentea, Calophyllum inophyllum, and Buchanania sp. serve as perches and transit sites.

Food Trees

The availability of fruit from tropical forest trees is key to the survival of birds of paradise. Three main food tree species have been identified: Knema tomentella: Produces fruit with lipid- and energy-rich arils, ideal for the active metabolism of birds of paradise. These birds also act as seed dispersers for tree regeneration (Gan et al., 2025). Pticoperma macarturri: A palm species with small, carbohydrate-rich fruits (Tella et al., 2016; Sejpal et al., 2025). This tree serves as an important food source when other large fruit trees are not bearing fruit (Takano et al., 2019); Pandanus sp.: Serves as a strategic alternative food source during the dry season when primary food is scarce (Sharma et al., 2025; De Souza et al., 2020; Wambrauw et al., 2023).

Roosting Tree

Roosting tree selection is based on safety from predators, trunk structure, and protection from the weather. The tree species found are: Pouteria sp.: Has a large size (>30 meters), straight trunk, hard bark, and stable horizontal branches for resting. This species also has the potential to double as a food source. Rest Behavior: Male birds tend to choose strategic and consistent roosting locations near display areas for energy efficiency and safety (Kidd & Rose, 2021; Tagawa et al., 2025). Repeated use of trees by the same individuals indicates high social and ecological value for the Cenderawasih community.

Activity Tree Biodiversity Index
Play Trees

Inventory results indicate that Transect III has the highest species diversity despite having the fewest individuals. This is due to a more even distribution among species compared to Transects I and II: Habitat Preference: Male Birds of Paradise (Paradisaea minor) select lek (dancing arena) sites in open canopies or horizontal branches with wide visibility; Ecological Function: The high diversity in Transect III provides ideal vertical and horizontal heterogeneity for lek platforms, food trees, and shelter; Structure vs. Quantity: High abundance of individuals (as in Transect I) or homogenous vegetation (Transect II) does not guarantee ideal habitat if dominated by a single species (Moyer et al., 2025).

Forage Trees

All three transects had the same number of species (3 species), but Transect III excelled with the highest Shannon index (1.10) and Evenness (1.0), indicating the most heterogeneous and balanced community. Forage Selectivity: Birds of Paradise are highly dependent on the availability of fruit from trees such as Schefflera, Ficus, Myristica, and Canarium (Whitbeck et al., 2016); Forage Continuity: The even community structure in Transect III ensures food availability throughout the season (Wijaya et al., 2020). Conversely, the dominance of certain species in Transect I reduces its ecological value (Banzhaf et al., 2014); Diversity Impact: Vegetation diversity directly influences the species richness of frugivorous birds and supports long-term population balance.

Sleeping Trees

The entire transect contains only one sleeping tree species, Pouteria sp., resulting in a diversity index value (Shannon, Simpson, and Brillouin) of 0 and a maximum dominance index value (1.00); Specialist Strategy: Unlike food trees, roosting is carried out specifically and selectively. Birds select trees based on the following criteria: sturdy/horizontal branches, tall crowns (>30m), and open locations above the canopy, yet with a dense leaf canopy for protection (Díaz-Rodríguez et al., 2024); Ecological Significance: The consistent use of Pouteria sp. indicates an adaptive strategy to increase nighttime safety (Howe, 2016). Low statistical diversity in sleeping trees is an indicator of high habitat selectivity, not biological (Acevedo-Ortiz et al., 2024); Conservation Implications: Due to their specific dependency, Pouteria sp. should be prioritized for vegetation protection and monitored to maintain local populations (Dawson et al., 2014).

Conclusion

Based on the research results, the vegetation supporting the activities of the Cenderawasih birds in the Tablasupa Village Forest consists of various types of trees specific to each activity. Trees used as play areas include the species Litsea tuberculata, Elaeocarpus spaericus, Buchanania sp, Prunus sp, Palaquium sp, and Aglaia argentea. For nutritional fulfillment activities, the

identified food trees are Knema tomentella, Pandanus sp, and Pticoperma macarturri, while sleeping activities are only concentrated on one species, namely Pouteria sp. In terms of community structure, the play trees in transects I and III consist of 3 species, while transect II has 2 species with varying total individual abundance. The dominance, evenness, and diversity indices of play trees in all transects are categorized as low, although the species richness in transects I and III is high. In the food tree category, the highest number of individuals was found in transect I (43 individuals), followed by transect III (24 individuals) and transect II (9 individuals). The highest dominance of food trees was in transect I, while the highest Shannon index was found in transect III, indicating a more even distribution of food types. For the sleeping tree category, the data showed absolute dominance of one species (Pouteria sp.) with a dominance index of 1.00, so that richness indices such as Margalef were no longer relevant to be calculated in this category. It is recommended for further researchers to conduct phenological observations (fruiting seasons) on the types of food trees found, in order to determine the fluctuations in the presence of Cenderawasih birds in each different season in Tablasupa Village.

Acknowledgments
We would like to thank all parties who supported this research. We hope this research is beneficial.

Author Contributions
Conceptualization; methodology; validation; formal analysis; investigation; resources; Data curation: writing—original draft preparation. Writing—review and editing: visualization: K. S., A. A. A., E. K. R. All authors have read and approved the published version of the manuscript.

Funding
The researchers funded this research independently.

Conflicts of Interest
The researchers funded this research independently.

References

Acevedo-Ortiz, M. A., Lugo-Espinosa, G., Ortiz-Hernández, Y. D., Pérez-Pacheco, R., Ortiz-Hernández, F. E., Martínez-Tomás, S. H., & Tavera-Cortés, M. E. (2024). Nature-Based Solutions for Conservation and Food Sovereignty in Indigenous Communities of Oaxaca. *Sustainability*, *16*(18), 8151. https://doi.org/10.3390/su16188151

Albalawi, B. F. A. (2025). Urbanization and habitat loss: An overview of rapidly growing cities in Saudi Arabia. *Frontiers in Sustainable Cities*, *7*, 1636228. https://doi.org/10.3389/frsc.2025.1636228

Banzhaf, E., De La Barrera, F., Kindler, A., Reyes-Paecke, S., Schlink, U., Welz, J., & Kabisch, S. (2014). A conceptual framework for integrated analysis of environmental quality and quality of life. *Ecological Indicators*, *45*, 664–668. https://doi.org/10.1016/j.ecolind.2014.06.002

Butchart, S. H. M., Akçakaya, H. R., Berryman, A. J., Brooks, T. M., Burfield, I. J., Chanson, J., Dias, M. P., Donaldson, J. S., Hermes, C., Hilton-Taylor, C., Hoffmann, M., Luedtke, J. A., Martin, R., McDougall, A., Neam, K., Polidoro, B., Raimondo, D., Rodrigues, A. S. L., Rondinini, C., … Vine, J. (2025). Measuring trends in extinction risk: A review of two decades of development and application of the Red List Index. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *380*(1917), 20230206. https://doi.org/10.1098/rstb.2023.0206

Chen, F., Jiang, F., Ma, J., Alghamdi, M. A., Zhu, Y., & Yong, J. W. H. (2024). Intersecting planetary health: Exploring the impacts of environmental stressors on wildlife and human health. *Ecotoxicology and Environmental Safety*, *283*, 116848. https://doi.org/10.1016/j.ecoenv.2024.116848

Dahdouh-Guebas, F., Hugé, J., Abuchahla, G. M. O., Cannicci, S., Jayatissa, L. P., Kairo, J. G., Kodikara Arachchilage, S., Koedam, N., Mafaziya Nijamdeen, T. W. G. F., Mukherjee, N., Poti, M., Prabakaran, N., Ratsimbazafy, H. A., Satyanarayana, B., Thavanayagam, M., Vande Velde, K., & Wodehouse, D. (2021). Reconciling nature, people and policy in the mangrove social-ecological system through the adaptive cycle heuristic. *Estuarine, Coastal and Shelf Science*, *248*, 106942. https://doi.org/10.1016/j.ecss.2020.106942

Dawson, I. K., Leakey, R., Clement, C. R., Weber, J. C., Cornelius, J. P., Roshetko, J. M., Vinceti, B., Kalinganire, A., Tchoundjeu, Z., Masters, E., & Jamnadass, R. (2014). The management of tree genetic resources and the livelihoods of rural communities in the tropics: Non-timber forest products, smallholder agroforestry practices and tree commodity crops. *Forest Ecology and Management*, *333*, 9–21. https://doi.org/10.1016/j.foreco.2014.01.021

De Souza, F. G., De Araújo, F. F., De Paulo Farias, D., Zanotto, A. W., Neri-Numa, I. A., & Pastore, G. M. (2020). Brazilian fruits of Arecaceae family: An overview of some representatives with promising food, therapeutic and industrial applications. *Food Research International*, *138*, 109690. https://doi.org/10.1016/j.foodres.2020.109690

Develey, P. F. (2021). Bird Conservation in Brazil: Challenges and practical solutions for a key

megadiverse country. *Perspectives in Ecology and Conservation*, *19*(2), 171–178. https://doi.org/10.1016/j.pecon.2021.02.005

Díaz-Rodríguez, P., Rodríguez-Darias, A. J., & Arnaiz-Schmitz, C. (2024). Protected Areas and Their Contribution to Sustainable Development. *Sustainability*, *16*(5), 1763. https://doi.org/10.3390/su16051763

Gan, J. L., Grainger, M. J., Shirley, M. D. F., Davis, S., Watson, M., Dube, S., & Pfeifer, M. (2025). Effectiveness of perches in promoting bird-mediated seed dispersal for natural forest regeneration: A systematic review. *Environmental Evidence*, *14*(1), 10. https://doi.org/10.1186/s13750-025-00363-8

Gonçalves-Souza, D., Verburg, P. H., & Dobrovolski, R. (2020). Habitat loss, extinction predictability and conservation efforts in the terrestrial ecoregions. *Biological Conservation*, *246*, 108579. https://doi.org/10.1016/j.biocon.2020.108579

Howe, H. F. (2016). Making dispersal syndromes and networks useful in tropical conservation and restoration. *Global Ecology and Conservation*, *6*, 152–178. https://doi.org/10.1016/j.gecco.2016.03.002

Kidd, P., & Rose, P. (2021). Influences of Rearing Environment on Behaviour and Welfare of Captive Chilean Flamingos: A Case Study on Foster-Reared and Parent-Reared Birds. *Journal of Zoological and Botanical Gardens*, *2*(2), 174–206. https://doi.org/10.3390/jzbg2020013

Kindlmann, P., Tsiftsis, S., Buchbauerová, L., Traxmandlová, I., & Štípková, Z. (2025). How Will Environmental Conditions Affect Species Distribution and Survival in the Coming Decades—A Review. *Diversity*, *17*(11), 793. https://doi.org/10.3390/d17110793

Li, Y., Chen, Z., Peng, C., Huang, G., Niu, H., & Zhang, H. (2021). Assessment of habitat change on bird diversity and bird–habitat network of a Coral Island, South China Sea. *BMC Ecology and Evolution*, *21*(1), 137. https://doi.org/10.1186/s12862-021-01865-y

Liepiņa, A. A., Jansone, D., Elferts, D., Barone, I., Donis, J., & Jansons, Ā. (2024). The Effects of the Selective Removal of Adjacent Trees on the Diversity of Oak-Hosted Epiphytes and Tree-Related Microhabitats. *Plants*, *13*(21), 3019. https://doi.org/10.3390/plants13213019

Lin, L., Ren, X., Shimizu, H., Wang, C., & Zou, C. (2024). Spatial Patterns and Associations of Tree Species in a Temperate Forest of National Forest Park, Huadian City, Jilin Province, Northeast China. *Forests*, *15*(4), 714. https://doi.org/10.3390/f15040714

Moyer, I. M., Copeland, A., Egan, K., & Collins, A. G. (2025). Investigating faunal diversity and abundance in the Marianas midwater. *Frontiers in Marine Science*, *12*, 1556454. https://doi.org/10.3389/fmars.2025.1556454

Panda, B. P., Prusty, B. A. K., Panda, B., Pradhan, A., & Parida, S. P. (2021). Habitat heterogeneity influences avian feeding guild composition in urban landscapes: Evidence from Bhubaneswar, India. *Ecological Processes*, *10*(1), 31. https://doi.org/10.1186/s13717-021-00304-6

Rajpar, M. N. (2018). Tropical Forests Are An Ideal Habitat for Wide Array of Wildlife Species. In *Tropical Forests – New Edition*. InTech. https://doi.org/10.5772/intechopen.73315

Rajpar, M. N., Khan, S. A., Ditta, A., Ali, H. M., Ullah, S., Ibrahim, M., Rajpar, A. H., Zakaria, M., & Salem, M. Z. M. (2021). Subtropical Broad-Leaved Urban Forests as the Foremost Dynamic and Complex Habitats for a Wide Range of Bird Species. *Sustainability*, *13*(23), 13021. https://doi.org/10.3390/su132313021

Raunsay, E. K. (2020). Pohon Aktivitas Paradisaea minor jobiensis Rothschild, 1897 di Hutan Imbowiari Barawai Yapen, Papua. *Jurnal Ilmu Lingkungan*, *18*(1), 133–139. https://doi.org/10.14710/jil.18.1.133-139

Raunsay, E. K., Kameubun, K. M., Antoh, A. A., Aisoi, L. E., & Kapitarauw, P. (2024). Keragaman Tumbuhan Pakan Burung Cenderawasih di Hutan Kampung Rhepang Muaif Kabupaten Jayapura. *BIOEDUSAINS:Jurnal Pendidikan Biologi Dan Sains*, *7*(1), 114–129. https://doi.org/10.31539/bioedusains.v7i1.9924

Raunsay, E. K., Rehiara, R. E., & Nurcholis, W. (2025). Conservation challenges of Birds of Paradise in Papua, Indonesia: A systematic literature review. *Brazilian Journal of Biology*, *85*, e289477. https://doi.org/10.1590/1519-6984.289477

Sejpal, M. A., Shi, L., Xie, R., Ghafoor, K., Ahmadi, F., & Suleria, H. A. R. (2025). Date palm fruit (Phoenix dactylifera L.): Structure, ripening, nutrition, and applications. *Discover Chemistry*, *2*(1), 169. https://doi.org/10.1007/s44371-025-00248-2

Sharma, K., Phongthai, S., Zhang, W., Wu, S., Jung, Y. H., & Rawdkuen, S. (2025). Unlocking the Potential of Peach Palm (Bactris gasipaes Kunth) for Plant-Based Foods: A Review of Nutritional, Techno-Functional, and Bioactive Attributes. *Foods*, *14*(23), 4134. https://doi.org/10.3390/foods14234134

Sun, J., Liu, B., Rustiami, H., Xiao, H., Shen, X., & Ma, K. (2024). Mapping Asia Plants: Plant Diversity and a Checklist of Vascular Plants in Indonesia. *Plants*, *13*(16), 2281. https://doi.org/10.3390/plants13162281

Tagawa, N., Tsuneoka, Y., & Funato, H. (2025). Nest-building behavior in laboratory mice: Multifunctional roles and neural mechanisms. *Neuroscience & Biobehavioral Reviews*, *178*, 106377. https://doi.org/10.1016/j.neubiorev.2025.106377

Takano, T., Kominami, Y., & Mizunaga, H. (2019). Do Coarser Gap Mosaics in Conifer Plantations Induce More Seed Dispersal by Birds? Temporal Changes during 12 Years after Gap Creation. *Forests*, *10*(10), 918. https://doi.org/10.3390/f10100918

Tan, L., Huang, R., Hao, P., Huang, Z., & Wang, Y. (2024). Distribution of Bird Communities and Habitat Corridor Composition Shaped by Environmental Factors in Urbanized Landscapes: A Case Study in Beijing, China. *Forests*, *16*(1), 1. https://doi.org/10.3390/f16010001

Tella, J. L., Dénes, F. V., Zulian, V., Prestes, N. P., Martínez, J., Blanco, G., & Hiraldo, F. (2016). Endangered plant-parrot mutualisms: Seed tolerance to predation makes parrots pervasive dispersers of the Parana pine. *Scientific Reports*, *6*(1), 31709. https://doi.org/10.1038/srep31709

Tu, H.-M., Fan, M.-W., & Ko, J. C.-J. (2020). Different Habitat Types Affect Bird Richness and Evenness. *Scientific Reports*, *10*(1), 1221. https://doi.org/10.1038/s41598-020-58202-4

Vaccaro, A. S., Filloy, J., & Bellocq, M. I. (2022). Bird taxonomic and functional diversity in urban settlements within a forest biome vary with the landscape matrix. *Perspectives in Ecology and Conservation*, *20*(1), 9–17. https://doi.org/10.1016/j.pecon.2021.10.001

Wahle, A., Graßmann, C., Zell, E., Leiss, L., Marcordes, B., Pagel, T. B., & Ziegler, T. (2025). Non-Passerine Birds in Zoos: A Global Approach on Distribution Patterns of Threatened Birds in Zoological Institutions. *Integrative Conservation*, *4*(4), 600–615. https://doi.org/10.1002/inc3.70043

Wambrauw, H. S., Raunsay, E. K., & E. Rehiara, R. (2023). Vegetation Analysis of Target Species for Feeding Lesser Yellow Bird of Paradise (Paradisaea minor jobiensis Rothschild, 1897) in the Imbowiari Forest Area of Barawai Village, Yapen Islands District, Papua Province, Indonesia. *Asian Journal of Natural Sciences*, *2*(2), 97–108. https://doi.org/10.55927/ajns.v2i2.4182

Whitbeck, K. L., Oetter, D. R., Perry, D. A., & Fyles, J. W. (2016). Interactions between macroclimate, microclimate, and anthropogenic disturbance affect the distribution of aspen near its northern edge in Quebec: Implications for climate change related range expansions. *Forest Ecology and Management*, *368*, 194–206. https://doi.org/10.1016/j.foreco.2016.03.013

Wijaya, I. M. S., Daryono, B. S., & Purnomo. (2020). Genetic variation and phylogenetic relationships of Thelymitra javanica (Orchidaceae: Orchidoideae) in East and Central Java, Indonesia. *Biodiversitas Journal of Biological Diversity*, *21*(3). https://doi.org/10.13057/biodiv/d210343

Yang, Y., Jia, Z., Ge, S., Li, Y., Kang, D., & Li, J. (2025). Determining Large Trees and Population Structures of Typical Tree Species in Northeast China. *Diversity*, *17*(7), 491. https://doi.org/10.3390/d17070491

Yeny, I., Garsetiasih, R., Suharti, S., Gunawan, H., Sawitri, R., Karlina, E., Narendra, B. H., Surati, Ekawati, S., Djaenudin, D., Rachmanadi, D., Heriyanto, N. M., Sylviani, & Takandjandji, M. (2022). Examining the Socio-Economic and Natural Resource Risks of Food Estate Development on Peatlands: A Strategy for Economic Recovery and Natural Resource Sustainability. *Sustainability*, *14*(7), 3961. https://doi.org/10.3390/su14073961