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Inventory of birds in the Peruvian Amazon: Case of lake Cuipari

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ABSTRACT. The study conducted at Lake Cuipari, located in Loreto, Peru, focused on the rich avifauna biodiversity of this Amazonian ecosystem, highlighting its significance for conservation and ecotourism. This study aimed to inventory bird species and assess the ecotourism potential of the area. Using visual and auditory census methods within a 4 km radius around the lake, invasive techniques were avoided to minimize the impact on the birds. Species were identified using high-resolution equipment, such as binoculars and audio recording devices, as well as through vocalization analysis. Field guides and taxonomic classifications were consulted to corroborate the identification. The results revealed a diversity of 110 bird species distributed across 23 orders and 43 families, including both native and migratory species. The conclusions of this study highlight the importance of Lake Cuipari as a significant area for avian conservation, particularly because of the presence of species classified as vulnerable (VU). While the lake currently supports diverse avifauna, the potential for latent threats, such as habitat degradation or human activities, underscores the need for proactive conservation measures. In addition, its ecological richness presents an opportunity to promote ecotourism in a sustainable manner. These findings emphasize the potential of birdwatching and biodiversity valorization to contribute to both ecosystem conservation and community well-being. Although this study provides valuable baseline data on avian diversity, further research and integrated management efforts are necessary to fully address the balance between conservation and local economic development. Such efforts should consider broader ecological and socioeconomic factors to support a more comprehensive approach to sustainable management.

Keywords: biodiversity; floodplain forests; species conservation; threatened species.

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Introduction

The Department of Loreto in the Peruvian Amazon stands out as an epicenter of avifaunal biodiversity, representing 55% of Peru's bird species, with approximately 1,040 species (Salinas et al., 2021). This diversity includes both endemic and migratory species, highlighting the global importance of this region in bird conservation. The composition and richness of these avian communities reflect the ecological health and functional diversity of the Amazonian ecosystem, indicating their capacity to support complex biological interactions and maintain ecosystem services (Gallardo-Vásquez & Casas-Luna, 2022; Martínez-Sovero & Iglesias-Osores, 2023; Mori-Pezo et al., 2023). These characteristics also underscore their influence on biogeographical and climatic processes at the regional and global levels (Capurucho et al., 2023; Vásquez-Arévalo et al., 2022).

Lake Cuipari, located in this biodiverse context, emerges as a unique habitat for diverse avian communities, offering ecosystems that include floodplain forests and upland areas (Camus et al., 2022). The composition and richness of these avian communities reflects the ecological health and functional diversity of the Amazonian ecosystem, indicating their capacity to support complex biological interactions and maintain ecosystem services. These characteristics also underscore its influence on biogeographical and climatic processes at regional and global levels (Capurucho et al., 2023; Vásquez-Arévalo et al., 2022). The avifaunal richness of this area also boosts ecotourism, a growing activity in the region that combines environmental conservation with local economic development (Cueva Vega & Rojas Vin, 2023; Esparza Huamanchumo et al., 2020).

However, despite its recognized ecological and economic importance, Lake Cuipari has been relatively underexplored compared to other areas of the Peruvian Amazon. Previous research has focused only on the

study of mammals and plants in Loreto (Cossios et al., 2022; Diaz et al., 2021); however, an analysis specifically centered on Lake Cuipari is lacking, which is crucial for understanding the dynamics and interactions of avian communities with their environment, as seen in studies by Flores-Ramírez et al. (2023) and Seminario-Córdova et al. (2022), Stemmer et al. (2022), and Tan et al. (2023).

Therefore, this study focuses on detailing the avian communities of Lake Cuipari and assessing their potential for ecotourism development. By identifying and characterizing the bird richness of this area, we aim to provide a foundation for planning ecotourism activities that are ecologically sustainable and economically beneficial for local communities.

Material and methods

Study area

The study was conducted in Lake Cuipari (39º35'18" E 93º41'499" N, zone 18M, WGS 84), located in the populated center of Cuipari, Province of Alto Amazonas, Department of Loreto, Peru. This area encompasses a linear range of 4 km around the lake, covering both the margins and central band. The study was conducted from January to April 2023 during the rainy season, a period that influences the availability of habitats and resources for birds. Sampling was conducted over 21 days, with observations carried out for 6 hours per day (3 hours in the morning and 3 hours in the afternoon). Each transect was monitored by three observers to ensure systematic coverage of the area.

Recording methodology

Sampling points were strategically distributed across the study area to capture habitat diversity, including floodplain forests and upland areas. Eleven points were established, as shown in Figure 1, with an average distance of 200 m between them to ensure data independence and minimize overlap. Combined visual and auditory censuses were used. Observations were conducted along predefined transects covering a total distance of 2,000 meters. Monitoring was carried out during two key intervals, from 6:00 to 9:00 am and from 3:00 to 6:00 pm, coinciding with peak bird activity hours (Bibby et al., 1992). Rotations between points ensured that temporal variations in bird activity were captured, and each point was revisited multiple times throughout the study period. The use of mist nets was avoided to minimize the impact on birds, adhering to the recommendations of the International Ornithologists' Union (2019).

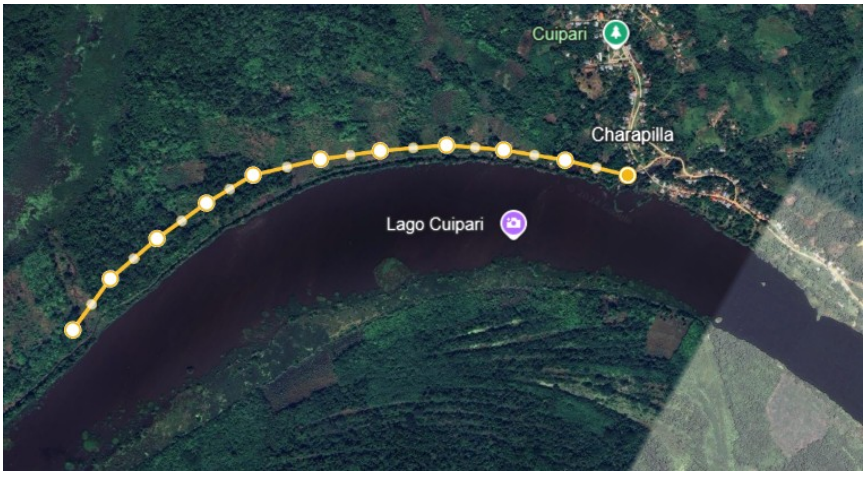

Figure 1. Bird recording transect.

Species Identification

High-resolution binoculars (Nikon Monarch 5, 8 × 42) and sound recording equipment (Tascam DR-05X Portable Audio Recorder with Sennheiser ME66 shotgun microphone) were employed for species identification following standardized protocols. Species were identified using the field guide of Schulenberg et al. (2010) and taxonomic classification by Plenge (2023). In addition, the observations were cross-referenced with historical records and verified through consultations with regional ornithology specialists to ensure accuracy and consistency.

Conservation Considerations and Species Categorization

The observed species were categorized based on their conservation status and endemism. This classification utilizes multiple reliable sources, including the field guide by Schulenberg et al. (2010), the bird list of Peru by Plenge (2023), the eBird platform (https://ebird.org) for distribution data, and the Avibase database (https://avibase.bsc-eoc.org/) for taxonomic and distribution information. Conservation status was assessed using both national and international standards, including the Red Book of Threatened Wildlife of Peru (Servicio Forestal y de Fauna Silvestre, 2018) and the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. The IUCN categories (e.g., Vulnerable, Endangered) provide a global perspective on the conservation priorities of the recorded species, complementing the regional data. This integrated approach ensures a comprehensive evaluation of avifauna conservation needs in the study area.

Ethical Considerations

During the study, all necessary measures were taken to ensure that data collection did not negatively affect birds or their habitats. A strict observation code of ethics was followed to minimize disturbance to the natural behavior of birds and ensure the welfare of the species and their ecosystems (International Ornithologists' Union, 2019).

Results and discussion

We present an inventory of the birds of Lake Cuipari in Table 1, highlighting the diversity within the class Aves, with representatives of multiple families. This table provides information on some of the most relevant bird species in the area, including their conservation status and distribution. While the study did not specifically address the ecological roles of these species, it lays the foundation for future research to explore their contributions to the Cuipari Lake ecosystem.

Table 1. List of bird species recorded in Lake Cuipari and surroundings. IUCN = LC: Lest Concern, VU: Vulnerable. CITES = Appendix II. N: Native, E: Endemic, M: Migratory, I: Introduced.

Order/Family/Species	Name in english	IUCN/CITES	N/E/M/I	Local name
Order Tinamiformes: Family Tinamidae				
Crypturellus cinereus	Cinereous Tinamou		N	Perdiz
Order Anseriformes: Family Anhimidae				
Anhima cornuta	Horned Screamer		N	Camungo
Order Anseriformes: Family Anatidae				
Cairina moschata	Muscovy Duck	LC -III	N	Pato
Order Galliformes: Family Cracidae				
Ortalis guttata	Speckled Chachalaca		N	Manasho
Order Columbiformes: Family Columbidae				
Columbina talpacoti	Ruddy Ground Dove		N	Rimusha
Leptotila verreauxi	White-tipped Dove		N	Torcaza
Claravis pretiosa	Blue Ground Dove		N	Torcacita
Patagioenas plumbea	Plumbeos pigeon		N	Torcaza
Columba livia	Rock Pigeon		I	Paloma
Patagioenas cayennensis	Pale-vented Pigeon		N	Torcaza
Order Cuculiformes: Family Cuculidae				
Piaya cayana	Squirrel Cuckoo		N	Chicua
Tapera naevia	Striped Cuckoo		N	Tunchi
Crotophaga ani	Smooth-billed Ani		N	Vaca muchach
Crotophaga major	Greater Ani		N	Coro coro
Order Nyctibiiformes: Family Nyctibiidae				
Nyctibius griseus	Common Potoo		N	Ayamama
Order Caprimulgiformes: Family Caprimulgidae				
Chordeiles rupestris	Sand-colored Nighthawk		N	Cacho
Nyctidromus albicollis	Common Pauraque		N	Cacho
Order Apodiformes: Family Trochilidae				
Glaucis hirsutus	Rufous-breasted Hermit	LC-II	N	Picaflor
Florisuga mellivora	White-necked Jacobin	LC-II	N	Picaflor
Chionomesa lactea	Sapphire-spangled Emerald		N	Picaflor
Phaethornis malaris	Great-billed Hermit	LC-II	N	Picaflor
Order Opisthocomiformes: Family Opisthocomidae				

Opisthocomus hoazin	Hoatzin		N	Shansho
Order Gruiformes: Family Rallidae				
Aramides cajaneus	Gray-cowled Wood-Rail		N	Unchala
Order Charadriiformes: Family Jacanidae				
Jacana jacana	Wattled Jacana		N	Tuqui tuqui
Order Charadriiformes: Family Laridae				
Phaetusa simplex	Large-billed Tern		N	Rayador
Order Suliformes: Family Phalacrocoracidae				
Nannopterum brasilianum	Neotropic Cormorant		N	Sacha pato
Order Pelecaniformes: Family Ardeidae				
Butorides striata	Striated Heron		N	Garza
Bubulcus ibis	Cattle Egret		N	Garza
Ardea alba	Great Egret		N	Garza
Nycticorax nycticorax	Black-crowned Night-Heron		N	Garza
Order Ciconiiformes: Family Ciconiidae				
Mycteria americana	Wood stork			Ciguña
Order Cathartiformes: Family Cathartidae				
Cathartes burrovianus	Lesser Yellow-headed Vulture			Rinawi
Cathartes aura	Turkey Vulture			Gallinazo
Coragyps atratus	Black Vulture			Gallinazo
Order Accipitriformes: Family Accipitridae				
Helicolestes hamatus	Slender-billed Kite	LC-II	N	Gavilán
Ictinia plumbea	Plumbeous Kite	LC-II	N	Gavilán
Buteogallus schistaceus	Slate-colored Hawk	LC-II	N	Gavilán
Rupornis magnirostris	Roadside Hawk	LC-II	N	Gavilán
Rostrhamus sociabilis	Snail kite	LC-II	N	Gavilan
Order Strigiformes: Family Strigidae				
Glaucidium brasilianum	Ferruginous Pygmy-Owl	LC-II	N	Urcotuto
Megascops choliba	Tropical Screech-Owl	LC-II	N	Lechuza
Order Coraciiformes: Family Alcedinidae				
Megaceryle torquata	Ringed Kingfisher		N	Catalán
Chloroceryle amazona	Amazon Kingfisher		N	Catalán
Chloroceryle americana	Green Kingfisher		N	Catalán
Order Galbuliformes: Family Galbulidae				
Galbalcyrhynchus leucotis	White-eared Jacamar		N	Jacamar
Galbula cyanescens	Bluish-fronted Jacamar		N	Jacamar
Order Galbuliformes: Family Bucconidae				
Monasa nigrifrons	Black-fronted Nunbird		N	Chuacullo
Order Piciformes: Family Capitonidae				
Capito aurovirens	Scarlet-crowned Barbet		N	Barbudo
Order Piciformes: Family Ramphastidae				
Ramphastos tucanus	White-throated Toucan	VU-II	N	Tucan
Pteroglossus castanotis	Chestnut-eared Aracari	LC-III	N	Pinsha
Order Piciformes: Family Picidae				
Campephilus melanoleucos	Crimson-crested Woodpecker			Carpintero
Colaptes punctigula	Spot-breasted Woodpecker			Carpintero
Melanerpes cruentatus	Yellow-tufted Woodpecker			Carpintero
Dryocopus lineatus	Lineated Woodpecker			Carpintero
Dryobates passerinus	Little Woodpecker			Carpintero
Order Falconiformes: Family Falconidae				
Daptrius chimachima	Yellow-headed Caracara			Shihuango
Daptirus ater	Black Caracara		N	Shihuango
Order Psittaciformes: Family Psittacidae				
Aratinga weddellii	Dusky-headed Parakeet	LC-II	N	Piwicho
Forpus crassirostris	Riparian Parrotlet			Piwicho
Brotogeris cyanoptera	Cobalt-winged Parakeet	LC-II	N	Piwicho
Brotogeris versicolurus	White-winged Parakeet	LC-II	N	Piwicho
Order Passeriformes: Family Thamnophilidae				
Thamnophilus doliatus	Barred Antshrike			
Akletos melanoceps	White-shouldered Antbird		N	
Taraba major	Great Antshrike			
Order Passeriformes: Family Formicariidae				
Formicarius analis	Black-faced Antthrush			
Order Passeriformes: Family Furnariidae				
Dendroplex picus	Straight-billed Woodcreeper		N	

Synallaxis gujanensis	Plain-crowned Spinetail	N	
Furnarius leucopus	Pale-legged Hornero	N	Titolo
Order Passeriformes: Family Cotingidae			
Gymnoderus foetidus	Bare-necked Fruitcrow	N	
Cotinga maynana	Plum-throated Cotinga	N	
Order Passeriformes: Family Tityridae			
Tityra semifasciata	Masked Tityra		
Pachyramphus polychopterus	White-winged Becard		
Order Passeriformes: Family Tyrannidae			
Arundinicola leucocephala	White-headed Marsh Tyrant	N	Viudita
Myiozetetes similis	Social Flycatcher	N	Pipito
Philohydor lictor	Lesser Kiskadee	N	Pipito
Myiarchus ferox	Short-crested Flycatcher	N	Pipito
Tyrannulus elatus	Yellow-crowned Tyrannulet	N	Pipito
Todirostrum maculatum	Spotted Tody-Flycatcher	N	Pipitillo
Tyrannus tyrannus	Eastern Kingbird	M	Pipito
Tyrannus melancholicus	Tropical Kingbird		Pipito
Myiozetetes granadensis	Gray-capped Flycatcher		Pipito
Megarynchus pitangua	Boat-billed Flycatcher		Pipito
Pitangus sulphuratus	Great Kiskadee		Pipito
Order Passeriformes: Family Vireonidae			
Vireo chivi	Chivi Vireo		
Order Passeriformes: Family Corvidae			
Cyanocorax violaceus	Violaceous Jay	N	Pian pian
Order Passeriformes: Family Hirundinidae			
Atticora fasciata	White-banded Swallow	N	Golondrina
Tachycineta albiventer	White-winged Swallow	N	Golondrina
Order Passeriformes: Family Troglodytidae			
Cantorchilus leucotis	Buff-breasted Wren	N	
Campylorhynchus turdinus	Thrush-like Wren	N	
Order Passeriformes: Family Donacobiidae			
Donacobius atricapilla	Black-capped Donacobius		
Order Passeriformes: Family Turdidae			
Turdus ignobilis	Black-billed Thrush	N	Zorzal
Order Passeriformes: Family Fringillidae			
Euphonia chlorotica	Purple-throated Euphonia	N	Dijuntillo
Order Passeriformes: Family Passerellidae			
Ammodramus aurifrons	Yellow-browed Sparrow	N	
Order Passeriformes: Family Icteridae			
Psarocolius angustifrons	Russet-backed Oropendola		Bocholocho
Psarocolius decumanus	Crested Oropendola		Bocholocho
Cacicus cela	Yellow-rumped Cacique	N	
Gymnomystax mexicanus	Oriole Blackbird	N	Pishcu
Icterus croconotus	Orange-backed Troupial	N	Pishcu
Order Passeriformes: Family Thraupidae			
Volatinia jacarina	Blue-black Grassquit		
Thraupis palmarum	Palm Tanager		Suisui
Thraupis episcopus	Blue-gray Tanager		Suisui
Ramphocelus carbo	Silver-beaked Tanager	N	
Sporophila bouvronides	Lesson's Seedeater		Gramerillo
Paroaria gularis	Red-capped Cardinal	N	
Cissopis leverianus	Magpie Tanager	N	
Saltator coerulescens	Bluish-gray Saltator	N	
Sporophila castaneiventris	Chestnut-bellied Seedeater	N	Gramerillo
Sporophila murallae	Caqueta Seedeater	N	Gramerillo
Ramphocelus nigrogularis	Masked Crimson Tanager	N	
Rhamphocelus carbo	Silver-beaked Tanager	N	
Saltator maximus	Buff-throated saltator	N	

Table 1 displays the existence of notable avian diversity in Lake Cuipari, with 110 identified species spread across 23 orders and 43 families. Among these species, 16 are included in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Moreover, the table shows that 83 of these species are native to the region, whereas there is one introduced species, *Columba livia*, and one migratory species, *Tyrannus tyrannus*. This diversity reflects the ecological richness of Lake Cuipari, highlighting its

importance as a key habitat for various bird species, which is consistent with findings in other Amazonian ecosystems (Salinas et al., 2021; Vásquez-Arévalo et al., 2022). The variety of species underscores the significant biodiversity of the area and offers a deep insight into the ecological complexities of the region. Additionally, the avian diversity at Lake Cuipari revealed a wide variety of species, ranging from aquatic to forest birds. This diversity reflects the heterogeneity of the habitats evaluated, including both lowland and upland areas, which provides a comprehensive representation of the species present in the study area. Species such as the "Muscovy Duck" and the "Neotropic Cormorant," which mainly inhabit bodies of water, along with others like the "Speckled Chachalaca" in forest habitats, demonstrate the variety of environments the lake supports (Capurucho et al., 2023). This diversity, along with interactions between different types of birds and their environments, highlights the ecological importance of the lake as a confluence point for a wide range of avian species.

On the other hand, the conservation status of species at Lake Cuipari, with examples like the "White-throated Toucan" classified as Vulnerable, underscores the significance of the lake in bird conservation. Several species face challenges owing to external factors, highlighting the urgent need to develop effective conservation strategies (Servicio Forestal y de Fauna Silvestre, 2018; Flores-Ramírez et al., 2023). Furthermore, the presence of introduced species such as the "Rock Pigeon" highlights human impact and the need for careful management of habitats to preserve the ecological integrity of the lake and maintain its ecological balance, where birds like the "Rufous-breasted Hermit" and the "Black-fronted Nunbird" play crucial ecological roles. Thus, the diversity and uniqueness of the birds in Lake Cuipari offer great potential for ecotourism. Promoting activities such as bird watching could bring economic benefits to local communities, increasing awareness and support for conservation. This approach not only benefits the local economy but also contributes to the protection of the ecosystem and its winged inhabitants, as observed in similar initiatives in other Amazonian regions (Seminario-Córdova et al., 2022; Tan et al., 2023).

Research in Cuipari reveals not only the richness of species, but also the need for management strategies that incorporate birdwatching practices. Following Flores-Ramírez et al. (2023), the development of strategic observation points based on Cuipari's specific richness could significantly enhance ecotourism experience. Additionally, as suggested by Mediawati et al. (2021), diversity in Cuipari, especially in less accessible areas, could show unique ecological patterns, offering opportunities for additional scientific research. Integrating conservation with ecotourism, as observed in the case of Laguna de los Patos (Seminario-Córdova et al., 2022), is crucial for the long-term sustainability of these areas.

These strategies not only benefit conservation, but also offer economic opportunities for local communities. As in the study by Stemmer et al. (2022), understanding the preferences of birdwatchers in Cuipari could help design experiences that satisfy both amateur and specialized observers. Tan et al. (2023) highlighted how the behavior and preferences of observers can influence bird conservation. This underscores the importance of careful and considerate management of ecotourism in Cuipari to minimize disturbances to birds and their habitats. Finally, the findings in Cuipari, compared to studies in other wetlands, such as Laguna de los Patos in Peru (Seminario-Córdova et al., 2022) and the Nonggang wetland in China (Tan et al., 2023), emphasize the need for a holistic approach that combines scientific research with ecotourism development. These examples illustrate how birdwatching initiatives have successfully promoted conservation awareness, while generating economic benefits for local communities. This approach must be adaptable and sensitive to ecological needs and local socioeconomic dynamics, ensuring that both biodiversity and human communities benefit sustainably.

The impact of climate change on Cuipari's avifaunal biodiversity is crucial, as climatic fluctuations could alter habitats and affect species migration and reproduction. This highlights the importance of monitoring and adapting the conservation strategies. Environmental education and community participation simultaneously play a fundamental role. Promoting knowledge about local bird life and involving communities in ecotourism ensures a more inclusive and sustainable approach and strengthens conservation and ecotourism initiatives.

Conclusion

The study conducted in Lake Cuipari highlights the diversity of avian species in the area, reflecting the ecological richness of this Amazonian ecosystem. Providing a detailed inventory of bird species contributes to the understanding of local biodiversity, and serves as a foundation for future research and conservation initiatives. These findings emphasize the importance of continued scientific efforts to document and protect

the region's natural heritage. The avian diversity observed in Lake Cuipari suggests potential opportunities for integrating birdwatching activities with community engagement. Although this study did not directly address ecotourism, the data provided could support future initiatives aimed at promoting environmental awareness and local economic benefits. Additionally, the conclusions highlight the need for ongoing environmental monitoring to better understand how external factors, including climate change, may influence a region's ecosystems over time.

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References

Bibby, C. J., Burgess, N. D., & Hill, D. A. (1992). Purpose and design in counting birds. In *Bird Census Techniques* (pp. 1-23). Academic Press. https://doi.org/10.1016/B978-0-12-095830-6.50006-7

Camus, C. E. R., Flores, M. A. M., Gardini, E. A., Panduro, W. D., & Amasifuen, B. P. (2022). Inventario de atractivos para el desarrollo turístico de la provincia de Alto Amazonas, Perú. *Revista Universidad y Sociedad, 14*(S1), 237-247. https://rus.ucf.edu.cu/index.php/rus/article/view/2627

Capurucho, J. M. G., Musher, L. J., Lees, A., Rego, M. A., Del-Rio, G., Aleixo, A., Luzuriaga-Aveiga, V. E., Ferreira, M., Ribas, C. C., & Thom, G. (2023). Amazonian avian biogeography: Broadscale patterns, microevolutionary processes, and habitat-specific models revealed by multidisciplinary approaches. *Ornithology*, *141*(1-2), 1-17. https://doi.org/10.1093/ornithology/ukad051

Cossios, E. D., Diaz, E., & Pizango, F. (2022). Mamíferos registrados con cámaras trampa en la zona de uso turístico de la reserva nacional Allpahuayo-Mishana, Loreto, Perú. *Folia Amazónica*, *31*(1), 31-45. https://doi.org/10.24841/fa.v31i1.564

Cueva Vega, E., & Rojas Vin, S. (2023). El turismo como fuente de desarrollo socioeconómico: caso Cocachimba, Amazonas 2020. *Aportes*, *1*(34), 131-141. https://doi.org/10.56992/a.v1i34.416

Diaz, S., Sánchez-Vendizú, P., Graham-Angeles, L., & Pacheco, V. (2021). Diversidad y conservación de los mamíferos mayores de Loreto, Perú. *Revista Peruana de Biología*, *28*(especial), 269-302. https://doi.org/10.15381/rpb.v28iespecial.21910

Esparza Huamanchumo, R. M., Gamarra Flores, C. E., & Ángeles Barrantes, D. (2020). El ecoturismo como reactivador de los emprendimientos locales en áreas naturales protegidas. *Universidad y Sociedad*, *12*(4), 436-443.

Flores-Ramírez, R., Sosa de la Cruz, C., Pinedo, H. G., Espejo, Y. R., & Calle, E. C. (2023). Bird watching to promote ecotourism in the Ricuricocha lagoon in Peru. *RIAT: Revista Interamericana de Ambiente y Turismo*, *19*(1), 29-35.

Gallardo-Vásquez, J., & Casas-Luna, S. (2022). Efecto de la presión antrópica sobre tres estratos vegetales y su impacto en la diversidad y distribución de avifauna en la ZOCRE Morro de Calzada, Perú. *Revista Amazónica de Ciencias Ambientales y Ecológicas*, *1*(1), 1-11. https://doi.org/10.51252/reacae.v1i1.290

International Ornithologists' Union. (2019). *IOU Code of Ethics General Statement*. https://www.internationalornithology.org/iou-code-ethics

Martínez-Sovero, G., & Iglesias-Osores, S. (2023). Descripción de la Familia Psittacidae que habita la reserva nacional de Tambopata, Perú. *Revista Amazónica de Ciencias Ambientales y Ecológicas*, *2*(2), 1-7. https://doi.org/10.51252/reacae.v2i2.520

Mediawati, I., Mukhlisi, Setiawan, J., Seputro, H., & Yassir, I. (2021). An inventory of mangrove forest bird to develop ecotourism in manggar river, Balikpapan City, Indonesia. *Journal of Hunan University Natural Sciences*, *48*(7), 60-66.

Mori-Pezo, R. R., Mendoza-Tamani, P., & Barbachán-Ruales, E. A. (2023). Aves del campus de la Universidad Nacional Autónoma de Alto Amazonas (Yurimaguas, Loreto, Perú). *Revista Peruana de Investigación Agropecuaria*, *2*(2), 1-7. https://doi.org/10.56926/repia.v2i2.42

Schulenberg, T., Stotz, D., Lane, D., O'Neill, J., & Parker, T. (2010). *Birds of Peru: Revised and updated edition*. Princeton University Press. https://doi.org/10.1515/9781400834495

Plenge, M. A. (2023). *Species and subspecies of the birds of Peru / Especies y subespecies de las aves del Perú*. Unión de Ornitólogos del Perú. https://sites.google.com/site/boletinunop/subespecies

Salinas, L., Arana, A., & Arana, C. (2021). Las aves del departamento de Loreto, Perú. *Revista Peruana de Biología*, *28*(especial), 108-146. https://doi.org/10.15381/rpb.v28iespecial.21915

Seminario-Córdova, R. A., Barreto, I. B., & Tuesta, Z. E. (2022). Ecotourism in Peru: Laguna de los Patos as a case study. *RIAT*: *Revista Interamericana de Ambiente y Turismo*, *18*(1), 87-100. https://doi.org/10.4067/S0718-235X2022000100087

Servicio Forestal y de Fauna Silvestre. (2018). *Libro Rojo de la Fauna Silvestre Amenazada del Perú*. https://sinia.minam.gob.pe/documentos/libro-rojo-fauna-silvestre-amenazada-peru

Stemmer, K., Aas, Ø., Veisten, K., & Lindberg, K. (2022). Assessing recreation specialization to guide nature-based tourism development: A hybrid choice model of birder destination preferences. *Journal of Outdoor Recreation and Tourism*, *39*, 1-10. https://doi.org/10.1016/j.jort.2022.100516

Tan, X., Yan, P., Liu, Z., Qin, H., & Jiang, A. (2023). Demographics, behaviours, and preferences of birdwatchers and their implications for avitourism and avian conservation: A case study of birding in Nonggang, Southern China. *Global Ecology and Conservation*, *46*, 1-10. https://doi.org/10.1016/j.gecco.2023.e02552

Vásquez-Arévalo, F. A., Saboya-Del-Castillo, P., Rojas-Padilla, O., & Gagliardi-Urrutia, G. (2022). Avifauna del Área de conservación regional "Bosques de Shunté y Mishollo" (Acr Boshumi), San Martin, Perú. *Folia Amazónica*, *30*(2), 121-136. https://doi.org/10.24841/fa.v30i2.568