



OPEN ACCESS

EDITED BY

Mário Gabriel Santiago Santos,
University of Trás-os-Montes and Alto
Douro, Portugal

REVIEWED BY

Sergio Cohuo Duran,
Technological University of
Chetumal, Mexico

*CORRESPONDENCE

Sergio A. Castro
sergio.castro@usach.cl

SPECIALTY SECTION

This article was submitted to
Urban Ecology,
a section of the journal
Frontiers in Ecology and Evolution

RECEIVED 12 July 2022

ACCEPTED 21 November 2022

PUBLISHED 06 December 2022

CITATION

Castro SA, Figueroa JA,
Garitano-Zavala Á, Leveau LM and
Lobo E (2022) Editorial: Ecological and
evolutionary processes in Neotropical
urban ecosystems.
Front. Ecol. Evol. 10:992438.
doi: 10.3389/fevo.2022.992438

COPYRIGHT

© 2022 Castro, Figueroa,
Garitano-Zavala, Leveau and Lobo.
This is an open-access article
distributed under the terms of the
[Creative Commons Attribution License
\(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or
reproduction in other forums is
permitted, provided the original
author(s) and the copyright owner(s)
are credited and that the original
publication in this journal is cited, in
accordance with accepted academic
practice. No use, distribution or
reproduction is permitted which does
not comply with these terms.

Editorial: Ecological and evolutionary processes in Neotropical urban ecosystems

Sergio A. Castro^{1*}, Javier A. Figueroa²,
Álvaro Garitano-Zavala³, Lucas M. Leveau⁴ and Eduardo Lobo⁵

¹Departamento de Biología, Facultad de Química y Biología, Universidad de Santiago, Santiago, Chile, ²Instituto de Investigación y Postgrado FINARQ, Universidad Central de Chile, Santiago, Chile, ³Instituto de Ecología, Facultad de Ciencias Puras y Naturales, Universidad Mayor de San Andrés, La Paz, Bolivia, ⁴Departamento de Ecología, Genética y Evolución, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Buenos Aires, Argentina, ⁵Departamento de Ciências da Vida, Universidade de Santa Cruz do Sul, Santa Cruz do Sul, Rio Grande do Sul, Brazil

KEYWORDS

urban ecology, urban birds, Neotropical realm, biodiversity, Latin America

Editorial on the Research Topic

Ecological and evolutionary processes in Neotropical urban ecosystems

Traditionally, cities have been founded in locations with high biodiversity. There, urban growth has brought about fragmentation of the landscape and loss of original habitats, impacting directly upon biodiversity. Currently, we are just beginning to understand the processes and mechanisms involved in these phenomena. The Neotropical realm is a biogeographic region that widely coincides with Latin America because it includes South America, Central America, the Caribbean, and southern North America (Wallace, 1876), and is the most biodiverse realm on the world. Its high biodiversity involves not only species richness and endemism, but unique supra-specific groups. Nonetheless, its awesome biodiversity is threatened by human occupation trends (Myers et al., 2000), and it is estimated that many species are becoming extinct even before they are described.

In the current feature, we made efforts to convene the presentation of emerging studies carried out in Neotropical cities, focalized mainly on birds. We seek to highlight how these studies have advanced an important topic, that of urban ecology. And our focus is mainly on ecological processes involving urban birds.

Nava-Díaz et al. used taxonomic, functional and phylogenetic diversities for describing bird communities in green areas of Mexico City. They asked whether urban areas act as filters for some lineages and functional traits in relation to random expectations obtained from null models. Their results showed that although area in itself increased taxonomic diversity, the phylogenetic and functional structures were mainly affected by green space isolation, with no evidence that the most urbanized green spaces represented a filter for functional traits or clades. Caula and Sanz D'Angelo studied the effect of urbanization on the biodiversity of islands by comparing bird communities between the urban areas of Margarita Island in the Caribbean Sea,

with Valencia City, located in continental Venezuela. They asked whether the spatial turnover or nestedness were more important for the conformation of urban bird communities. Nestedness is the subsampling of species in poorer sites from the richer sites, whereas species turnover is the replacement of species between sites. Their results showed that on the island the biodiversity loss caused by urbanization was most severe. However, dissimilarity in species composition along the urban gradient was driven by nestedness on the island, whereas species turnover was the main driver of species dissimilarity on the continent.

Studies focused on avian migrant species are particularly relevant in Neotropical cities because several are located in important wintering or stopover areas for regional or local bird migrants. Pacheco-Muñoz et al. conducted their study on two Nearctic-Neotropical migrants, the Yellow-rumped Warbler (*Setophaga coronata*) and the Nashville Warbler (*Leiothlypis ruficapilla*). These two overwintering migrants are commonly observed in green areas of Morelia, Mexico. The authors asked whether such areas inside the urban matrix are suitable for supporting the overwintering populations of both species, or instead they are ecological traps. Thus, they compared the body condition and population densities of those two species in urban green areas vs. non-urban sites, showing that although both species avoid densely constructed urban areas, the green areas within the urban matrix are suitable to maintain viable overwintering populations that allow warblers to replenish their fat reserves.

Villaseñor and Escobar studied the Green-backed Firecrown (*Sephanoides sephanioides*), a keystone species for the maintenance and regeneration of endemic southern forests of South America. These authors studied the occurrence of that species in Santiago (Chile), during the austral winter, in relation to the socioeconomic status of different neighborhoods. Their results showed that this hummingbird was less frequent in the poorer neighborhoods, where vegetation cover was scant, than in wealthier districts where higher woody and shrub cover provided food and shelter for the birds.

Most of urban areas in the world are located along coastlines (Baird, 2009). Nevertheless, the effects of urbanization on bird communities of coastal areas have been scarcely studied. Graells et al. analyzed the variation of bird communities in several coastal and inland habitats of Valparaíso (Chile) during winter and spring. Although they found similar species richness between urbanized and natural coastal habitats, species composition changed significantly. Depending on the season, species such as the Inca Tern (*Larosterna inca*) and the Peruvian Pelican (*Pelecanus thagus*) were more abundant in urbanized coastal areas, whereas the Kelp Gull (*Larus dominicanus*) and Franklin's Gull (*Leucophaeus pipixcan*) were more abundant in natural coastal habitats. The authors emphasize the need for urban planning to conserve bird coastal assemblages.

The tropical Andes constitute a global hotspot of bird diversity (Hawkins et al., 2007). Still, studies that analyze

bird community responses to urbanization in such region are scarce. Ordóñez-Delgado et al. analyzed bird diversity and foraging guilds across different land uses. They found significant decreases in bird diversity from forest to urban areas. Although the abundance of insectivorous birds declined from forest to urban sites, on the contrary the abundance of granivorous birds was higher in urban areas. Regarding foraging substrate, aerial, understory, and canopy birds decreased in abundance from forest to urban areas, whereas terrestrial birds increased in urban sites. Therefore, the authors conclude that food resources are the main factor influencing bird communities along the gradient studied, although the availability of nesting substrates could also be relevant.

In addition to foraging traits of bird species, behavioral adaptations may facilitate the bird colonization of urban areas (Blumstein, 2014). Nonetheless, studies about behavioral responses to urbanization in the Neotropics are scant too. Garitano-Zavala et al. analyzed the variation of boldness, neophobia, and problem solving in the Chiguanco Thrush (*Turdus chiguanco*) between urban and extra-urban habitats in La Paz (Bolivia). They found that birds in urban areas were bolder (lower flight initiation distance), less neophobic, and performed better in problem-solving tests than their rural siblings. These authors argued that the observed behavioral shifts came from preadapted traits rather than from evolutionary adaptation or epigenetic effects.

Although our initial objective was to focus on Neotropical examples of multi-taxa ecological and evolutionary processes in urban areas, the presented articles were dominated by ecological studies about birds. Therefore, studies on other taxa and focused on evolutionary processes are fundamental to advance the urban ecology topic in the Neotropical Region. In closing, we hope that these featured articles focused on urban birds will become an incentive to promote the study of biodiversity conservation from a broader perspective, and that they will contribute to understanding how cities are determining current and future Neotropical biodiversity trends.

Author contributions

ÁG-Z and LML critically reviewed articles on urban birds. All authors participated in the gestation of the idea of a Research Topic in the field of urban ecology and in the review process of submitted manuscripts. All authors contributed to the article and approved the submitted version.

Funding

LML was supported by the Agencia Nacional de Promoción de la Investigación, el Desarrollo Tecnológico y la Innovación, PICT 2018 03871. JAF acknowledge gratefully the support of

ANID/IDeA I+D ID21I10028, and CIP 2020016 (Universidad Central de Chile).

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

Baird, R. C. (2009). Coastal urbanization: the challenge of management lag. *Manag. Environ. Qual.* 20, 371–382. doi: 10.1108/14777830910963726

Blumstein, D. T. (2014). “Attention, habituation, and antipredator behaviour: implications for urban birds,” in *Avian Urban Ecology*, eds D. Gil and H. Brumm (Oxford University Press), 41–53.

Hawkins, B. A., Diniz-Filho, J. A. F., Jaramillo, C. A., and Soeller, S. A. (2007). Climate, niche conservatism, and the global

Publisher’s note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

bird diversity gradient. *Am. Nat.* 170, S16–S27. doi: 10.1086/519009

Myers, N., Mittermeier, R. A., Mittermeier, C. G., da Fonseca, G. A. B., and Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858. doi: 10.1038/35002501

Wallace, A. R. (1876). *The Geographical Distribution of Animals*. London: Macmillan.