frontiers | Frontiers in Ecology and Evolution

TYPE Editorial
PUBLISHED 14 November 2023
DOI 10.3389/fevo.2023.1296340

Check for updates

OPEN ACCESS

EDITED AND REVIEWED BY
Peter Convey,
British Antarctic Survey (BAS),
United Kingdom

*CORRESPONDENCE
Alejandra Zarzo-Arias
alejandra.zarzo@gmail.com

RECEIVED 18 September 2023
ACCEPTED 01 November 2023
PUBLISHED 14 November 2023

CITATION
Zarzo-Arias A, Uhl B, Maynard DS and Morales MB (2023) Editorial: The ecological niche at different spatial scales. *Front. Ecol. Evol.* 11:1296340. doi: 10.3389/fevo.2023.1296340

COPYRIGHT
© 2023 Zarzo-Arias, Uhl, Maynard and Morales. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). 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: The ecological niche at different spatial scales

Alejandra Zarzo-Arias[1,2]*, Britta Uhl[3,4], Daniel S. Maynard[5] and Manuel B. Morales[6]

[1]Department of Biogeography and Global Change, National Museum of Natural Sciences, Spanish National Research Council (CSIC), Madrid, Spain, [2]Department of Organisms and Systems Biology, Oviedo University, Oviedo, Spain, [3]Faculty of Biological Sciences, Institute for Ecology, Evolution and Diversity, Conservation Biology, Goethe University Frankfurt, Frankfurt am Main, Germany, [4]Biocenter, Animal Ecology and Tropical Biology, Applied Biodiversity Science, University of Würzburg, Würzburg, Germany, [5]Department of Genetics, Evolution, and Environment, University College London, London, United Kingdom, [6]Department of Ecology and Research Center in Biodiversity and Global Change (CIBC-UAM), Autonomous University of Madrid, Madrid, Spain

KEYWORDS

ecology, niche, spatial scale, species, environment

Editorial on the Research Topic
The ecological niche at different spatial scales

The ecological niche encompasses an intricate interplay between species and their environment, involving species' responses to environmental variables, use of resources, and interactions with other species. This concept, however, is far from static, exhibiting dynamism across spatial and temporal scales. From the microenvironments of microbial ecosystems to the macroscale landscapes that span continents, ecological niches shift, adapt, and diversify. Niche processes and availability influence global biodiversity distribution and local community resilience, shaping the composition of communities across scales. However, understanding their relative importance in assembling biodiversity remains a complex challenge. Local population establishment and persistence, species coexistence in communities, landscape-level co-occurrence patterns, and regional geographic distributions all reflect multiple eco-evolutionary mechanisms and processes, including dispersal, adaptation, coevolution, human influence, and other non-niche processes. To grasp these complexities, research necessarily involves identifying commonalities across diverse disciplines, determining what aspects can be transferred or translated between scales, and elucidating the mechanisms of these transitions. This Research Topic comprises studies on niche drivers, patterns, and consequences across spatial scales, emphasizing their relationship with ecosystem-level biodiversity.

The studies included in this Research Topic explored the intricate relationships between different taxa and environmental factors, and several key findings emerge. First, ecological niches are vital for understanding species richness patterns, especially in tropical bird communities, where specialized adaptations and evolutionary interactions play a significant role, highlighting the sensitivity of these species to human-induced habitat disturbances (Sherry). Second, vegetation complexity, represented by canopy height, plays a pivotal role in influencing both regional and local species richness of forest birds in eastern Australia (Remeš et al.). This complexity especially facilitates species coexistence in local communities, but also indirectly impacts species diversity by shaping the size of the regional species pool. Third, for

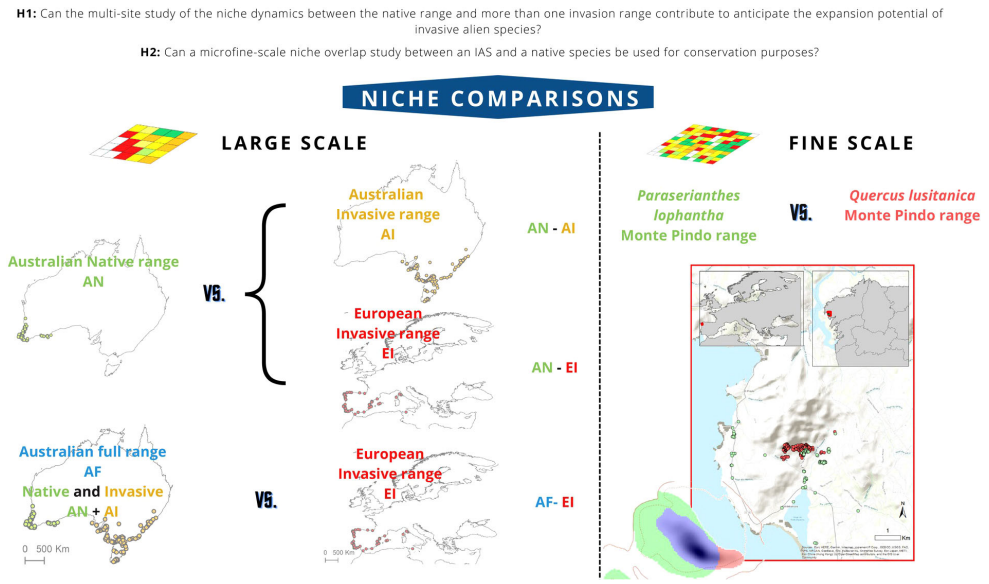

FIGURE 1
The large-scale study of *Paraserianthes lophantha* macroclimatic niche dynamics involves a comparison between niches from its Australian native range and its Australian invasive range (AN-AI comparison), from its Australian native range and its European invasive range (AN-EI), and from its full Australian range (native and invasive) and its European invasive range (AF-EI). The fine-scale study of niche overlap between *P. lophantha* and *Quercus lusitanica* involves comparisons between the niches occupied by both species in the local area of Monte Pindo in northwest Spain. Source: Reproduced from Santamarina et al.

invasive species management, understanding niche dynamics and overlap with native species is crucial. This was demonstrated in the analysis of the invasive tree *Paraserianthes lophantha* accounting for both its native (western Australia) and invasive (eastern Australia and southwestern Europe) ranges (Figure 1), emphasizing the need to account for the native niche in order to more accurately predict the potential invasion range and impact (Santamarina et al.). On the other hand, European beetle species' invasiveness was found to be associated with niche dynamics, including niche expansion in invaded areas and the use of different climatic spaces, particularly for species with a larger native niche breadth (Simoes et al.). Fourth, climate change is projected to impact habitat suitability for Madrean Pine-Oak trees, with varying effects depending on the spatial extent, highlighting the need to acknowledge different scales when exploring species' niches (Carrell et al.). Lastly, sympatric rhinolophid bats in Southwestern China exhibited trophic niche differentiation influenced by factors like echolocation calls and body size, stressing the importance of considering the influence of multiple factors on species' niches (Dai et al.).

Overall, these studies underscore the complex dynamics of ecological niches, highlighting their relevance across different spatial scales and taxonomic groups. They emphasize the importance of considering multiple scales in understanding species niches, and illustrate how accounting for the spatial scale can provide more accurate insights into ecosystem dynamics under the current global change and biodiversity crisis. A key feature of these results is that they demonstrate that the niche cannot be seen as a static, fixed entity, but rather that it is highly context dependent, and varies across spatial and temporal scales. In doing so, these findings demonstrate the need for comprehensive and scale-aware approaches to biodiversity conservation, invasive species control, and climate change mitigation, illustrating how the intricate interplay between species and their environments is a critical component of ecosystem management and preservation. The understanding of ecological niches at diverse spatial scales carries important implications for the informed management of ecosystems, conservation practices, and the accurate prediction of ecological responses to the challenges posed by climate and global change. By exploring the complexity of niche processes across scales, this Research Topic helps identify key patterns and processes that hold across ecosystems and taxa. Ultimately, this Research Topic endeavors to unravel the complex tapestry of niche strategies in species' adaptation to the changing processes of ecosystems worldwide.

Author contributions

AZ-A: Writing – original draft, Writing – review & editing. BU: Writing – review & editing. DM: Writing – review & editing. MM: Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. AZ-A was supported by a Margarita Salas contract financed by the European Union – NextGenerationEU, Ministerio de Universidades y Plan de Recuperación, Tranformación y Resiliencia (Spain) through the call of Oviedo University.

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.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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.