



frontiers of biogeography

the scientific magazine of the International Biogeography Society

Title:

Biogeography of a fragmenting world

Journal Issue:

[Frontiers of Biogeography, 7\(2\)](#)

Author:

[Hortal, Joaquín](#), Department of Biogeography and Global Change, Museo Nacional de Ciencias Naturales (MNCN-CSIC), 28006 Madrid, Spain. jhortal@mncn.csic.es Editor in Chief Frontiers of Biogeography <http://escholarship.org/uc/fb> <http://www.biogeography.org/html/fb.html>

[Field, Richard](#), School of Geography, University of Nottingham, NG7 2RD, UK. deputy Editor in Chief Frontiers of Biogeography <http://escholarship.org/uc/fb> <http://www.biogeography.org/html/fb.html>

Publication Date:

2015

Permalink:

<http://escholarship.org/uc/item/23t1c94r>

Author Bio:

RyC Research Fellow at the Dept. of Biodiversity and Evolutionary Biology of Spanish Scientific Council's Natural History Museum (MNCN, CSIC)

Keywords:

biogeography, conservation, extinction, global change, fragmentation

Local Identifier:

fb_28322

Copyright Information:

Copyright 2015 by the article author(s). This work is made available under the terms of the Creative Commons Attribution 4.0 license, <http://creativecommons.org/licenses/by/4.0/>



eScholarship
University of California

eScholarship provides open access, scholarly publishing services to the University of California and delivers a dynamic research platform to scholars worldwide.

Biogeography of a fragmenting world

Part of the value of biogeography as a multidisciplinary transversal science is its wide applicability to processes that occur at multiple scales. One such process is the extinction of species resulting from the disappearance of their habitats. Habitat loss and fragmentation are widespread, and, together with habitat degradation and other human impacts, they probably constitute the aspect of global change that contributes the most to current extinction rates (see, e.g., Sandom et al. 2014), although climate change and biological invasions also play significant roles in changing the ecological dynamics of species (see the book reviews by Hinsley 2015 and Cassey 2015 in this issue).

Island biogeography is particularly useful for understanding the complex effects of habitat loss and fragmentation on biodiversity, for it provides a solid theoretical background to study and model extinction trends (Harris 1984). Using this conceptual framework, Matthews (2015) studied different aspects of biodiversity variation in habitat fragments, finding that trends in these habitat islands are complex and change from one system to another, with traditional island biogeographic relationships only being applicable to a very limited extent. Importantly, some of this lack of transferability can be attributed to the effects of non-native species or the characteristics of human disturbance, rather than to a lack of generality of the principles of island biogeography. Further, the nature and extent of habitat degradation in the matrix surrounding the habitat islands turn out to be important in Matthews' (2015) research, adding a new dimension to island biogeographic enquiry. High-quality datasets such as the one provided by Bergamin et al. (2015) for the vegetation of the highly fragmented Brazilian Atlantic forest will further enhance our knowledge about the effects of habitat transformation on biodiversity loss.

Islands can also contribute to the study of habitat change and extinctions in that they can act as natural experiments, where isolation has resulted in the existence of many (pseudo)replicates of limited size with similar ecological conditions and similar but, at the same time, independent evolu-

tionary processes and species pools. The work of Lavery (2015) on northern Melanesian mammals is a nice example of how the distribution, ecology and evolution of several groups and lineages can be studied from a holistic, multidisciplinary perspective in archipelagos and island complexes. This integrative perspective is also adopted for the study of particular biomes, such as the South African Fynbos (Ojeda 2015), but is particularly difficult when these biomes occupy large areas or are located in areas with considerable biotic interchange.

Some of the complexity of continental settings can be untangled by studying areas of intermediate isolation, such as peninsulas, and explicitly addressing temporal patterns. The combination of data on past (through pollen) and current distribution of species with macroecological and multivariate analyses allow Gavin (2015) to study the stability of habitats in the Olympic Peninsula (Washington, USA) throughout the end of the Pleistocene and the Holocene. At a larger temporal scale, the macroevolutionary study of extinction risk allows understanding of which species may be more prone to extinction, although habitat loss continues to play a major role in determining which species may be finally lost (DeNeve et al. 2015). Here, the important development of statistical tools to analyse temporal and spatial data (Dale & Fortin 2015, Hartig 2015) allows understanding of trends and drivers from multiple sources of data. A multidisciplinary approach, using transversal frameworks and addressing topics of broad interest to biogeographers, can perhaps best account for the many facets of the impacts of global change. This major strength of biogeography is nicely encapsulated by the papers within this issue of *Frontiers of Biogeography*.

Joaquín Hortal¹ and Richard Field²

Frontiers of Biogeography editors-in-chief

¹Departament of Biogeography and Global Change, Museo Nacional de Ciencias Naturales (MNCN-CSIC), 28006 Madrid, Spain. jhortal@mncn.csic.es

²School of Geography, University of Nottingham, NG7 2RD, UK. richard.field@nottingham.ac.uk

References

- Bergamin, R.S., Duarte, L.D.S., Marcilio-Silva, V., Seger, G.D.D.S., Liebsch, D. & Marques, M.C.M. (2015) Compilation of woody species occurring in the Brazilian Atlantic Forest complex. *Frontiers of Biogeography*, 7, 69–72.
- Cassey, P. (2015) A continent invaded. *Frontiers of Biogeography*, 7, 80–81.
- Dale, M.R.T. & Fortin, M.-J. (2014) *Spatial Analysis: A guide for ecologists*, 2nd edition. Cambridge University Press, Cambridge, UK.
- DeNeve, D., Nye, J. & Blois, J. (2015) Monotypic species and extinction risk: looking at lagomorphs. *Frontiers of Biogeography*, 7, 35–37.
- Gavin, D.G. (2015) Vegetation stability and the habitat associations of the endemic taxa of the Olympic Peninsula, Washington, USA. *Frontiers of Biogeography*, 7, 38–51.
- Harris, L.D. (1984) *The fragmented forest: island biogeographic theory and the preservation of biotic diversity*. University of Chicago Press, Chicago.
- Hartig, F. (2015) Dale & Fortin – the revised guide to spatial analysis. *Frontiers of Biogeography*, 7, 78–79.
- Hinsley, S.A. (2015) Birds on the brink? *Frontiers of Biogeography*, 7, 75–77.
- Lavery, T.H. (2015) The mammals of Northern Melanesia: biogeography, systematics and ecology. *Frontiers of Biogeography*, 7, 52–59.
- Matthews, T.J. (2015) Analysing and modelling the impact of habitat fragmentation on species diversity: a macroecological perspective. *Frontiers of Biogeography*, 7, 60–68.
- Ojeda, F. (2015) A second look at fynbos biodiversity. *Frontiers of Biogeography*, 7, 73–74.
- Sandom, C., Faurby, S., Sandel, B. & Svenning, J.-C. (2014) Global late Quaternary megafauna extinctions linked to humans, not climate change. *Proceedings of the Royal Society of London B*, 281, 20133254.

Accepted: 31 July 2015