David García-Callejas

Contact Information

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Research Interests

I am a community ecologist broadly interested in understanding the structure and dynamics of ecological assemblages, their spatiotemporal patterns, and their response to global change drivers. In particular, I study the role of biotic interactions in shaping local and regional patterns of diversity and coexistence. In approaching these themes, I aim to bridge theoretical approaches to fundamental questions with field experiments and observations.

Current Appointments

Postdoctoral researcher, University of Canterbury and Landcare Research New Zealand — November 2021 to present

Previous Appointments

Postdoctoral researcher, University of Cadiz — February 2020 to September 2021

Postdoctoral researcher, EBD-CSIC — January 2019 to November 2019

Doctoral researcher, CREAF-UAB — September 2014 to November 2018

Research technician, Imperial College — January 2014 to August 2014

Research technician, University of Évora — March 2013 to January 2014

Research technician, CREAF — September 2012 to February 2013

Education

Ph.D. in Terrestrial Ecology, Autonomous University of Barcelona — 11/2018

- Thesis Title: *Structure and dynamics of ecological networks with multiple interaction types*
- Advisors: Dr. Miguel B. Araújo, Dr. Roberto Molowny-Horas
- Qualification: *Magna Cum Laude* with International Doctorate Distinction.
- Associated stays: Integrative Ecology Lab, Univ. of Sherbrooke (Quebec), 09–12/2017, supervised by Prof. Dominique Gravel
- Thesis document and LaTeX template available at: https://github.com/garciacallejas/Thesis

M.Sc. in Terrestrial Ecology, Autonomous University of Barcelona — 09/2012

- Thesis Title: *Projecting the distribution and abundance of Mediterranean tree species under climate change: a demographic approach*
- Advisors: Prof. Javier Retana, Dr. Roberto Molowny-Horas
- 60 ECTS

B.S. in Environmental Sciences, University of Alcala — 07/2010

- 300 ECTS

B.S. in Computer Science, University of Granada — 09/2006

- 180 ECTS

Refereed Journal Publications

[1] Allen-Perkins, A., **García-Callejas, D.**, Bartomeus, I., Godoy, O. 2023. Structural asymmetry in biotic interactions as a tool to understand and predict ecological persistence. *Ecology Letters*, in press. doi:10.1111/ele.14291

[2] **García-Callejas, D.**, Godoy, O., Buche, L., Hurtado, M., Lanuza, J.B., Allen-Perkins, A., Bartomeus, I. 2023. Non-random interactions within and across guilds shape the potential to coexist in multi-trophic ecological communities. *Ecology Letters*, 26:831-842.
doi:10.1111/ele.14206

[3] Paniw, M., **García-Callejas, D.**, Lloret, F., Bassar, R.D., Travis, J., Godoy, O. 2023. Pathways to global-change effects on biodiversity: new opportunities for dynamically forecasting demography and species interactions. *Proceedings of the Royal Society B*, 290:20221494.
doi:10.1098/rspb.2022.1494

[4] Mestre, F., Gravel, D., **García-Callejas, D.**, Pinto-Cruz, C., Matías, M.G., Araújo, M.B. 2022. Disentangling environment food web relationships: a review with guidelines. *Basic and Applied Ecology*, 61:102-115.
doi:10.1016/j.baae.2022.03.011

[5] **García-Callejas, D.**, Bartomeus, I., Godoy, O., 2021. The spatial configuration of biotic interactions shapes coexistence-area relationships in an annual plant community. *Nature Communications*, 12:6192.
doi:10.1038/s41467-021-26487-2

[6] Civantos-Gónzalez, I., Algarra, F. J., **García-Callejas, D.**, Galeano, J., Godoy, O., Bartomeus, I. Fine scale prediction of ecological community composition using a two-step sequential machine learning ensemble. *Plos Computational Biology*, 17(12):e1008906.
doi:10.1371/journal.pcbi.1008906

[7] Taheri, S., **García-Callejas, D.**, Araújo, M.B., 2021. Discriminating climate, land-cover and random effects on species range dynamics. *Global Change Biology*, 27:1306-1317.
doi:10.1111/gcb.15483

[8] **García-Callejas, D.**, Godoy, O., Bartomeus, I. 2020. cxr: A toolbox for modelling species coexistence in R. *Methods in Ecology and Evolution*, 11:1221-1226.
doi:10.1111/2041-210X.13443
Associated R package: https://github.com/RadicalCommEcol/cxr

[9] **García-Callejas, D.**, De la Cruz Rot, M. 2020. Cómo crear paquetes de R. *Ecosistemas*, 29:1948.
doi:10.7818/ECOS.1948

[10] **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B., Gravel, D. 2019. Spatial cascades in communities connected by dispersal and foraging. *Ecology*, 100:e02820.
doi:10.1002/ecy.2820

[11] **García-Callejas, D.**, Torres, A. 2019. Restauración de interacciones ecológicas: medidas y consecuencias a escala de comunidad. *Ecosistemas*, 28:42-49.
doi:10.7818/ECOS.1748

[12] **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B. 2018. The effect of multiple biotic interaction types on species persistence. *Ecology*, 99:2327–2337.
doi:10.1002/ecy.2465

[13] **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B. 2018. Multiple interactions networks: towards more realistic descriptions of the web of life. *Oikos*, 127:5–22.
doi:10.1111/oik.04428 (Editor's choice)

[14] **García-Callejas, D.**, Molowny-Horas, R., Retana, J. 2017. Projecting the distribution and abundance of Mediterranean tree species under climate change: a demographic approach. *Journal of Plant Ecology*, 10:731–743. doi:10.1093/jpe/rtw081 (Editor's choice)

[15] **García-Callejas, D.**, Araújo, M.B. 2016. The effects of model and data complexity on predictions from species distributions models. *Ecological Modelling*, 326:4–12. doi:10.1016/j.ecolmodel.2015.06.002

Preprints and papers under review

[16] **García-Callejas, D.**, Lavorel, S., Ovaskainen, O., Peltzer, D.A., Tylianakis, J. Species traits and community structure can drive scale-dependent propagation of effects in ecosystems. *Manuscript under review*. Preprint available: *biorXiv*, 10.1101/2023.11.15.567315 doi:10.1101/2023.11.15.567315

[17] Martins, L., **García-Callejas, D.**, Lai, H.R., Wootton, K., Tylianakis, J.M. The propagation of disturbances in ecological networks. *Manuscript under review*.

[18] Allen-Perkins, A., Hurtado, M., **García-Callejas, D.**, Godoy, O., Bartomeus, I. Individual-based plant-pollinator networks unveils pollen flow dynamics and plant reproductive success. *Manuscript under review*. Preprint available: *biorXiv*, 2021.04.23.441120 doi:10.1101/2021.04.23.441120

[19] **García-Callejas, D.** On the variability of Species Abundance Distributions with trophic guild and community structure. Preprint available: *biorXiv*, 289348 doi:10.1101/289348

Workshops

[20] Optimizing the use of R for a reproducible science. In: *King's College, Geography Department*, London, 05-6/09/2022.

[21] Managing your R code towards reproducibility. In: *27th DZG Graduate Meeting in Evolutionary Biology*, Bielefeld, 01/04/2022.

[22] Taller de simulación de dinámicas poblacionales en R. In: *1st AEET Festival of Ecology*, El Rocío, 19/05/2022.

Conference Talks/Posters (as first author)

[23] Talk: **García-Callejas, D.**, Godoy, O, Hurtado, M., Buche, L., Lanuza, J.B., Allen-Perkins, A., Bartomeus, I. Stability of multi-trophic communities: more than the sum of its parts. In: *AEET 2021 Meeting*, 18-21/10/2021.

[24] Talk: **García-Callejas, D.**, Bartomeus, I., Godoy, O. Species-area relationships emerge from multiple coexistence mechanisms. In: *BES 2020 Meeting*, 14-18/12/2020.

[25] Talk: **García-Callejas, D.**, Bartomeus, I., Hurtado, M., Godoy, O. Variability of an ecological multilayer network across space and interaction types. In: *NetSci conference*, 20-24/08/2020.

[26] Talk: **García-Callejas, D.**, Godoy, O., Bartomeus, I. cxr: a toolbox for modelling species interactions and coexistence in R. In: *BES Quantitative Ecology Meeting*, 27-30/07/2020.

[27] Talk: **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B., Gravel, D. Spatial cascades in networks connected by dispersal and foraging. In: *SIBECOL*, Barcelona, 04–07/02/2019.

[28] Talk: **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B. Species persistence in networks with multiple interaction types. In: *NetSci conference*, Paris, 11–14/06/2018.

[29] Talk: **García-Callejas, D.** The influence of trophic position on Species Abundance Distributions. In: *Ecology across borders*, Ghent, 11–14/12/2017.

[30] Poster: **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B. Multiple interactions networks: towards more realistic descriptions of the web of life. In: *Community Ecology for the 21st Century*, Évora, 17–19/10/2016. (Best poster award)

Invited Talks

[31] **García-Callejas, D.** ignatures of spatial cascades mediated by dispersal and foraging in trophic metacommunities In: Workshop: *Spillover effects of natural enemies on heterogeneous landscapes*, Estación Experimental de Zonas Áridas (EEZA-CSIC) , 09/06/2023.

[32] **García-Callejas, D.** How can so many species coexist? An exploration of space and ecological interactions. In: *Alfred Wallece Seminar Series*, University of Evora, 04/04/2023.

[33] **García-Callejas, D.** Análisis de dinámicas poblacionales en R. In: *AEET Ecoinformatics seminars*, 06/06/2022.

[34] **García-Callejas, D.** Towards understanding how species coexist in complex ecological communities. In: *Doñana Biological Station*, Sevilla, 03/03/2022.

[35] **García-Callejas, D.**, Molowny-Horas, R., Araújo, M.B. Multiple interactions networks in community ecology: towards more realistic representations of the web of life. In: *Centre for Advanced Studies*, Blanes, 10/01/2019.

[36] **García-Callejas, D.**, Molowny-Horas, R., Retana, J. Distribution and abundance of tree species: A spatially explicit model for Peninsular Spain. In: *Forest sciences centre of Catalonia*, Solsona, 10/12/2012.

Teaching Experience

Academic year	Institution*	Course	hours	materials
2022-23	UAB	Advanced topics in Ecology (M.Sc.)	12h theory	-
2022-23	UAB	Ecology (B.Sc.)	16h computer prac.	-
2022-23	UAB	Ecology (B.Sc.)	22h field/lab prac.	-
2021-22	UHU	Advanced statistics for Conservation (M.Sc.)	25h theory	LINK
2021-22	UAB	Advanced topics in Ecology (M.Sc.)	12h theory	-
2021-22	UAB	Ecology (B.Sc)	60h field/class prac.	-
2021-22	CEA	R Data analysis	12h theory	LINK
2021-22	CEA	Introduction to R	6h theory	-
2020-21	UHU	Advanced statistics for Conservation (M.Sc.)	20h theory	LINK
2020-21	CEA	Introduction to R	16h theory	LINK
2020-21	CEA	Reproducible analysis with R	16h theory	LINK
2019-20	UHU	Advanced statistics for Conservation (M.Sc.)	5h theory	LINK
2020-21	CEA	Introduction to R	16h theory	LINK
2020-21	CEA	Reproducible analysis with R	16h theory	LINK
2017-18	UAB	Environmental Cartography (B.Sc.)	19h computer prac.	-
2017-18	UAB	Vegetation Cartography (B.Sc.)	23h computer prac.	-
2017-18	UAB	Conservation Biology (B.Sc.)	12h theory	-
2017-18	UAB	Forest Ecology (B.Sc.)	1h theory	-
2016-17	UAB	Ecology (B.Sc.)	31h field prac.	-
2016-17	UAB	Statistics and Modelling (M.Sc.)	1h theory	-
2015-16	UAB	Ecology (B.Sc.)	46h field prac.	-
2015-16	UAB	Statistics and Modelling (M.Sc.)	1h theory	-

* UAB: Universitat Autònoma de Barcelona; UHU: Universidad de Huelva; CEA: Centro de estudios andaluces

Student Supervision

M.Sc. Theses:

- 2021 - David Diaz Mulero - *Diversity and structure of ecological networks in agricultural habitats* - Pablo de Olavide University (Sevilla, Spain) - co-supervised with Dr. Ignasi Bartomeus.

- 2021 - Laura Buonafede - *Ecological filtering of butterfly species associations by urban environments* - University of Firenze/CREAF - co-supervised with Dr. Yolanda Melero.

Projects

As Principal Investigator:

- 2021 - NETMAP: Advancing the biogeography of interaction networks - Funded by the Spanish Association for Terrestrial Ecology - 2500€

Awards

- Special Award for Doctoral Studies, 2018/19. Autonomous University of Barcelona, Spain.
- FPU Visiting researcher scholarship, 2017. Science and Education Ministry, Spain.
- FPU Ph.D. scholarship programme, 2014–2018. Science and Education Ministry, Spain.
- M.Sc. scholarship programme, 2011–2012. "Fundación Obra Social La Caixa", Spain.
- International scholarship programme, 2010. "Fundación Bancaja", Spain.

Organizational work

Organizing Committees:

- 1st Joint AEET-SFE2 Conference for Early Career Scientists - 09-11 June 2021 (full program here)
- 1st AEET Festival of Ecology - 18-20 May 2022 (full program here)

Languages

- First Language: Spanish.
- English: Proficient reading, speaking, writing.
- Catalan: Proficient reading, basic speaking and writing.
- Portuguese, Italian: Intermediate reading, basic speaking and writing.

Software skills

- Proficiency in R (statistical analyses, spatial and temporal analyses, data management and visualization, dynamic models, package development).
- Knowledge of Unix shell, software parallelization in HPC.
- Intermediate user of C++.
- Git user, expertise in Latex (e.g. developed an open template for Ph.D. thesis, available at https://github.com/garciacallejas/Thesis).
- Familiarity with QGIS and open source graphics software (GIMP, InkScape).

Evaluation and referee service

- Evaluator for the United States' National Science Foundation Grants Program (2020).
- Reviewer for scientific journals (since 2016): Global Ecology and Biogeography, Ecography, Journal of Ecology, Nature Ecology and Evolution, mSystems, Functional Ecology, Oikos, Ecology and Evolution, Journal of Animal Ecology, Journal of Environmental Informatics, Ecology Letters.

Selected media coverage

- Biodiversity in Doñana (in Spanish): Interview in Youtube
- News outlets on restoring species interactions (in Spanish): [1] [2] [3] [4] [5] [6]

References

- Dr. Ignasi Bartomeus - Doñana Biological Station - nacho.bartomeus@gmail.com
- Dr. Oscar Godoy - University of Cádiz - oscar.godoy@uca.es
- Prof. Miguel Araújo - National Museum of Natural History, Spain - maraujo@mncn.csic.es