Catherine Hulshof

> ⚖ **This applicant's basic qualifications have not yet been evaluated.** Basic qualifications should be determined before further review.

Bundle contents

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✉ 3 letters of reference (Level requires 3 references)

Applicant overview

Current employment

Assistant Professor, Virginia Commonwealth University

Degree

PhD
University of Arizona
Advisor: Brian Enquist
Degree disciplines:

- 26.1310: Ecology and Evolutionary Biology

Position overview

JPF01680 ☑
Assistant Professor in Plant Community Ecology

Botany and Plant Sciences / College of Nat & Agr Sciences
University of California, Riverside

Review online at

https://aprecruit.ucr.edu/analyst/application/59964/review

Curriculum Vitae

Your most recently updated C.V.

PDF	Download link	https://aprecruit.ucr.edu/analyst/applications/59964/documents/12513
	Filename	Hulshof_CV_UCR.pdf (374 KB)
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DR. CATHERINE M. HULSHOF DE LA PEÑA, PHD

Assistant Professor | Department of Biology | Virginia Commonwealth University
Email: cmhulshof@vcu.edu   Website: biodiversityresearchlab.com

ACADEMIC APPOINTMENTS

2018 –   Assistant Professor, Department of Biology, Virginia Commonwealth University
2018 –   Research Associate, Smithsonian Institution National Museum of Natural History
2014 – 2017   Assistant Professor, Department of Biology, University of Puerto Rico Mayagüez
2013 – 2014   NSF Postdoctoral Research Fellow, Department of Environmental Science & Policy, University of California Davis

EDUCATION

2013   PhD in Ecology and Evolutionary Biology, Minor in Global Change
Department of Ecology and Evolutionary Biology, University of Arizona
2006   BA in Biology with a double major in Chemistry, University of Pennsylvania

PROFESSIONAL EXPERIENCE

2009 – 2012   NSF Graduate Research Fellow, Department of Ecology and Evolutionary Biology, University of Arizona
2011 – 2012   Research Assistant, Water Resources Research Center, University of Arizona
2009   Grant Writer, Environmental Education Exchange, Tucson, Arizona
2007 – 2008   Research Associate, Conservation International TEAM Network
2002 – 2006   Federal Work-Study, Department of Biology, University of Pennsylvania

COMPETITIVE RESEARCH GRANTS

2021   NSF CAREER: Predicting functional trait variation across spatial, temporal, and biological scales ($1.06M)
2018   NSF Macrosystems Biology Early Career Award: Climate change and plants on unusual soils ($300K)
2017   NSF EPSCoR Research Infrastructure Improvement Track 4: Image analysis of tropical Lepidoptera – Using Artificial Intelligence for biodiversity collections in the Big Data era ($195K)
2016   Puerto Rico Science, Technology, and Research Trust: Digitization of museum Lepidoptera collections for biodiversity conservation ($70K)
2015   USFS Endangered Species Grant: The ecology of edaphic endemism ($45K)
2014   University of Puerto Rico Mayagüez Internal Competitive Research Grant ($5K)
2010   Institute of the Environment Graduate Dissertation Grant, University of Arizona ($5K)
2008   Latin America Tinker Summer Field Research Grant, University of Arizona ($5K)
2005   NSF Research Experience for Undergraduates ($15K distributed over three summers in Area de Conservación Guanacaste, Costa Rica)

AWARDS & FELLOWSHIPS

2022	VCU Internal Nominee Moore Inventor Fellowship Program
2021	VCU College of Humanities & Sciences Excellence in Scholarship Award
2021	rstudio::global(2021) Diversity Scholar
2016	Ecological Society of America Education Scholar
2014	Gordon Conference Carl Storm Underrepresented Minority Fellowship
2013	NSF Postdoctoral Research Fellowship in Biology
2012	Ecological Society of America SEEDS Travel Award
2010	Philanthropic Educational Organization Scholar Award National Nominee
2009	NSF Graduate Research Fellowship Program
2009	Ford Foundation Diversity Fellowship Doctoral Program
2008	Organization for Tropical Studies NSF International Research Fellowship
2007	Graduate Diversity Fellowship Award, University of Arizona
2006	Nassau Research Award, University of Pennsylvania
2006	Binns-Williams Research Award, University of Pennsylvania

PUBLICATIONS

* Graduate Student, + Undergraduate Student, ǂ Corresponding Author

Under Review or In Prep (MS available, data deposition in Dryad planned upon publication)

1. Umaña MN, **CM Hulshof**. Trait variation is stable across spatial and temporal scales in a subtropical forest. *Under Review* in *Ecology*.
2. Walter J, Atkins J, **CM Hulshof**. Climate and topography shape variation in the tropical dry forest-wet forest ecotone. *In Prep* for *Ecography*.
3. ǂ **Hulshof CM**, +Ojeda Cana O, +Velázquez Román L, Ackerman J, Franqui RA, Restrepo C. Temperature seasonality and wing size mediate taxonomic and functional homogenization of tropical Lepidoptera. *In Prep* for *Proceedings of the Royal Society B*.
4. * Kusi E, **Hulshof CM**, Kester K. Tri-trophic interactions in species distribution models: An example from a plant-herbivore-parasitoid system. *In Prep* for *Ecological Entomology*.

Peer-reviewed
1. + Samojedny TJ, *Garnica Diaz C, Grossenbacher DL, Adamidis GC, Dimitrakopoulos PG, Siebert SJ, Spasojevic MJ, ǂ Hulshof CM, Rajakruna N. Specific leaf area is modulated by ultramafic soils across biogeographical regions. *Accepted*. *Plant Ecology and Diversity*.
2. ǂ **Hulshof CM**, Umaña MN. Power laws and predicting plant trait variation across spatiotemporally heterogeneous environments. *Early View*. *Global Ecology and Biogeography*. Paper. No data generated.
3. * Garnica-Díaz C, Berazaín Iturralde R, Cabrera B, *Calderón Morales E, Felipe Tamé FL, García R, Gómez Hechavarría JL, Guimarães AF, Medina E, Paul ALD, Rajakaruna N, Restrepo C, Siebert SJ, van den Berg E, Van der Ent A, Velasquez G, ǂ **Hulshof CM**. Global plant ecology of tropical ultramafic ecosystems. *The Botanical Review.Accepted* Paper. Data.
4. * Richins A, **Hulshof CM**. 2022. Deer exclusion regenerates native plant functional responses, but not species richness in an eastern serpentine savannah. *Frontiers in Conservation Science*. 3:874304. Paper. Data forthcoming.

5.   McEntire K, Gage M, Gawne R, Hadfield M, **Hulshof CM**, Johnson M, Levesque D, Segura J, Pinter N. 2021. Understanding drivers of variation and predicting variability across levels of biological organization. *Integrative and Comparative Biology*, icab160. Paper.

6.   Vargas G, Brodribb T, Dupuy J, González-M R; **Hulshof CM**, Medvigy D, Allerton T, Pizano C, Salgado-Negret B, Schwartz N, Van Bloem S, Waring B, Powers J. 2021. Beyond leaf habit: Generalities in plant function across 102 tropical dry forest tree species. *New Phytologist* 232: 148-161. Paper. Data.

7.   Waring B, De Guzman M, Du D, Dupuy J, Gei M, Gutknecht J, **Hulshof CM**, Jelinski N, Margenot A, Medvigy D, Pizano C, Salgado-Negret B, Schwartz N, Trierweiler A, Van Bloem S, Vargas G, Powers J. 2021. Soil biogeochemistry across Central and South American tropical dry forests. *Ecological Monographs* 91: e01453. Paper. Data.

8.   ‡ **Hulshof CM**, Spasojevic MJ. The edaphic control of plant diversity. 2020. *Global Ecology and Biogeography* 29: 1634-1650. Paper. Data. *Top cited paper 2021.*

9.   ‡ **Hulshof CM**, Waring BG, Powers JS, Harrison SP. 2020. Trait-based signatures of cloud base height in a tropical cloud forest. *American Journal of Botany* 107: 1-9. Paper. Data.

10. Swenson NG, **Hulshof CM**, Katabuchi M, Enquist BJ. 2020. Long-term shifts in the functional composition and diversity of a tropical dry forest: a 30-yr study. *Ecological Monographs* 90: e01408. Paper. Data.

11. * Wales S, Kreider M, **Hulshof CM**, Atkins J, Fahey RT, Nave LE, Nadelhoffer KJ, Gough CM. 2019. Stand age, disturbance history and the temporal stability of forest production. *Forest Ecology and Management* 460: 117865. Paper.

12. ‡ **Hulshof CM**, Powers JS. 2019 Tropical forest composition and function across space and time: Insights from diverse gradients in Área de Conservación Guanacaste. *Biotropica* 52: 1065-1075. Top Cited Paper 2021-2022. Paper.

13. + Echevarría Ramos M, ‡ **Hulshof CM**. 2019. Using digitized museum collections to understand the effects of habitat on wing coloration in the Puerto Rican monarch *Biotropica* 51: 477-483. Paper. Data.

14. Wieczynski D, Boyle B, Buzzard V, Duran S, Henderson A, **Hulshof CM**, Kerkhoff A, McCarthy M, Michaletz S, Swenson S, Asner G, Bentley L, Enquist B, Savage V. 2019. Climate shapes and shifts functional biodiversity in forests worldwide. *Proceedings of the National Academy of Sciences* 116: 587-592. Paper. Data.

15. * Derroire G, Powers J, **Hulshof CM**, Varela L, Healy J. 2018. Contrasting patterns of leaf trait variation among and within species during tropical dry forest succession in Costa Rica. *Nature Scientific Reports* 8: 285. Paper. Data.

16. Agosta SJ, **Hulshof CM**, *Staats E. 2017. Herbivore performance, climate, and leaf traits in regenerating tropical dry forests. *Journal of Animal Ecology* 86: 590-604. Paper. Data.

17. Allen K, Dupuy JM, Gei MG, **Hulshof CM**, Medvigy D, Pizano C, Salgado-Negret B, Smith CM, Trierweiler A, Van Bloem SJ, Waring BG, Xu X, Powers JS. 2017. Will seasonally dry tropical forests be sensitive or resistant to future changes in rainfall regimes? Special Issue *Environmental Research Letters* 12: 023001s. Featured in Highlights of 2017. Paper.

18. * Buzzard V, **Hulshof CM**, Violle C, Enquist BJ. 2016. Regrowing a tropical dry forest: Functional trait diversity during secondary succession. *Functional Ecology* 30: 1006-1013. Paper. Data.

19. ‡ **Hulshof CM**, Swenson N, Weiser M. 2015. Tree height-diameter allometry across the United States. *Ecology and Evolution* 5: 1193-1204. Paper.

20. ‡ **Hulshof CM**, Violle C, Spasojevic M, McGill B, Damschen E, Harrison S, Enquist B. 2013. Intra-specific and interspecific variation in specific leaf area reveal the importance of abiotic and biotic drivers of species diversity across elevation and latitude. *Journal of Vegetation Science* 24: 921-931. Paper.

21. ‡ **Hulshof CM**, Martinez-Yrizar A, Burquez A, Boyle B, Enquist B. 2013. Functional plant trait variation in tropical dry forests: A review and synthesis. In Tropical Dry forests of the Americas: Ecology, Conservation, and Management (eds. J. Powers and A. Sanchez), CRC Press, New York. pp 129-140. Book chapter.

22. Violle C, Enquist BJ, McGill B, Jiang L, Albert CH, **Hulshof CM**, Jung V, and J Messier. 2012. Viva la variance! A reply to Nakagawa & Schielzeth. *Trends in Ecology and Evolution* 27: 475-476. Paper.

23. Violle C, Enquist B, McGill B, Jiang L, Albert C, **Hulshof CM**, Jung V, Messier J. 2012. The return of the variance: intraspecific variability in community ecology. *Trends in Ecology and Evolution* 27: 244-252. Paper.

24. ‡ **Hulshof CM**, Swenson NG, Stegen JJ, Enquist CF, Enquist BJ. 2012. Interannual variability of growth and reproduction in the tropical tree Bursera simaruba – The role of allometry and resource variability. *Ecology* 93:180–190. Paper.

25. ‡ **Hulshof CM**, Swenson NG. 2010. Variation in leaf functional trait values within and across individuals and species: An example from a Costa Rican dry forest. *Functional Ecology* 24: 217 – 223. Paper.

DEPARTMENTAL SEMINARS & SELECTED CONFERENCE PRESENTATIONS ** Invited*

2023   *   *University of Minnesota, Plant and Microbial Biology Seminar Series, scheduled*
           Biodiversity science for understanding local to planetary scale responses to climate change

2022   *   *University of Guelph, Department of Biology*
           Biodiversity for a Changing Planet
      *   *University of Puerto Rico Rio Piedras, Department of Biology*
           Biodiversity for a Changing Planet
      *   *University of Massachusetts Amherst, Organismic and Evolutionary Biology*
           Biodiversity science for understanding local to planetary scale responses to climate change
      *   *Virginia Commonwealth University, Department of Biology*
           Biodiversity science for understanding local to planetary scale responses to climate change
      *   *University of Virginia, Department of Environmental Sciences*
           Ecotones are sentinels of climate change at local to continental scales
      *   *Trinity University, Department of Biology*
           Ecotones are sentinels of climate change at local to continental scales
      *   *Iowa State University, Department of Ecology, Evolution and Organismal Biology*
           Ecotones are sentinels of climate change at local to continental scales

2021   *   *The University of Washington at St. Louis Tyson Research Center Seminar Series*
           Climate change in the tropical wet forest - dry forest transition zone
      *   *Ekmanianthe Dominican Association of Students of Biology (in Spanish)*
           Los ecotonos tropicales y el cambio climático
      *   *University of Maine, School of Biology and Ecology*
           Beyond Big Data: What is the next scientific revolution?

2020   *   *Cornell University, Department of Ecology and Evolutionary Biology Seminar Series*
           Advancing a trait scaling theory to predict variance in space and time

2020	*	*Association for Tropical Biology and Conservation Special Symposium* (cancelled)
2018		*Ecological Society of America Annual Meeting*
		Species and trait diversity of an insular tropical Lepidoptera assemblage
	*	*University of Florida Gainesville, Department of Biology Seminar Series*
		How seasonal is seasonal? Climatic and functional trait variation in seasonal tropical forests
2017		*Congreso de Biodiversidad Caribeña, Santo Domingo, República Dominicana (in Spanish)*
		Variabilidad climática y la diversidad funcional en los bosques secos tropicales
2016		*Ecological Society of America Annual Meeting*
		Climatic variability and functional diversity in tropical dry forests
2015	*	*Association of Tropical Biology and Conservation Symposium*
		Trait-based signatures of climate-induced changes in a tropical cloud forest
	*	*University of Puerto Rico Rio Piedras Seminar Series (in Spanish)*
		Variabilidad climática y la diversidad funcional en los bosques secos tropicales
2014	*	*Gordon Research Conference Unifying Ecology across Scales*
		Caterpillar performance, climate, and leaf traits in a regenerating tropical forest
2011	*	*Organization for Tropical Studies, Undergraduate Tropical Ecology Semester Course*
		The functional trait approach for testing long-standing ideas in ecology

MENTORING

Mentees' current position in italics

Chair	**Pablo Lopez Bustamante** (PhD, 2022 –). Reassembly of tropical forests.
	Emelia Kusi (co-chair with Karen Kester, MSc 2019–2021). The effects of abiotic and biotic factors on hornworm distributions. Awarded VCU's Department of Biology Outstanding Graduate Student. *PhD student, University of Massachusetts*.
	Dayneris Aparicio Jimenez (MSc 2018–2020). The effects of wing traits on the recovery of Lepidoptera post-Hurricane Maria. *Community engagement in Tampa, FL.*
	Claudia Garnica-Diaz (MSc 2018–2020). Effects of climatic and edaphic factors on plant trait variation across elevation. *PhD student, University of Florida Gainesville*.
	Allyson Richins (MSc 2018–2020). Plant-pollinator associations in an eastern serpentine savannah and the effects of overbrowsing. Awarded Rice River Center Research Award. *Data Analytics, Bureau of Land Management, New Mexico.*
	Amelia Mateo Jimenez (MSc 2016–2018). Phenology of a tropical dry forest in Dominican Republic. *Instructor, Universidad Autónoma de Santo Domingo.*
Member	Lisa Turner (PhD, 2018–); Sequoia Mosby (MSc, 2020–); Constance Bolte (PhD, 2018–2022); Tristan Allerton (PhD, 2017–2020); Baron Lin (MSc, 2019–2021); Alex Brown (MSc, 2019–2021); Shannon Walker (MSc, 2018–2020); Elsa Chen (MSc, 2018–2020); Maxim Grigri (MSc, 2018–2020); Rebecca Dahlberg Piri (MSc, 2017–2019); Audrey Kirschner (MSc, 2018–2019); Shea Wales (MSc, 2018–2019)
Undergraduate	**Alanis Rosa-Santiago** (UPRRP, 2022–). Functional plant diversity of Caribbean tropical dry forests. Awarded Puerto Rico Louis Stokes Alliance for Minority Participation Summer Research Award ($6k).
	Eric Escobar-Chena (VCU, 2022–). ESA SEEDS chapter at VCU.

Undergraduate **Caitlin Terry** (VCU, 2022–). History of Lepidoptera research in Puerto Rico.
Angela Hong (VCU, 2018–2019). Image analysis of butterfly size and color.
Tristan Rivera (VCU, 2018–2019). Plant-insect associations in Puerto Rico.
Luis Velázquez Román (UPRM, 2018). NSF REU Luquillo Long Term Ecological Research Network. The effect of climate change on Puerto Rican butterfly distribution. Presented work at ESA Annual Meeting. Received NSF REU travel award. *MSc student, University of Puerto Rico Rio Piedras*.
Mariangelí Echevarría (UPRM, 2017). Phenotypic variation in the Puerto Rican monarch. Received Mindlin Foundation Undergraduate Research Award ($5k) for travel and presentation at ATBC Annual Meeting in Malaysia 2018. Co-led butterfly technology exhibit at Feria Para La Naturaleza (the largest science fair on the island). *MSc student, Boston University*.
Oscar Ojeda Cana (UPRM, 2017). Digitization of Puerto Rican Lepidoptera collections. Co-led butterfly technology exhibit at Feria Para La Naturaleza.
Andrea Lopez (UPRM, 2015). Urban plant diversity and function. Presented work at the UPRM Undergraduate Biology Research Symposium, May 2016.
Vanessa Buzzard (UA, 2010). Tropical dry forest succession. Published peer-reviewed journal and presented at Ecological Society of America Annual Meeting. *Completed PhD, now research technician, University of Arizona*.

TEACHING
* New curriculum development; in-person unless otherwise noted

Virginia Commonwealth University, Department of Biology
*Online tutorials: YouTube channel: [Biodiversity Data Science](), 946 subscribers; 35,171 views
*Capstone: Envisioning Future Earth with SEEDS, Undergraduate, 2 credits
    [Fall 2022]()   15 students, online synchronous
Ecology, Undergraduate, 3 credits
    [Fall 2022]()   75 students, online asynchronous
    [Fall 2021]()   235 students, online asynchronous
*EcoCode: Environmental Data Science, Undergraduate, 3 credits
    Fall 2020   9 students, online asynchronous; [YouTube Playlist]()
*Data Science for Biologists, Graduate, 3 credits
    [Fall 2020]()   7 students, online asynchronous; [YouTube Playlist]()
    Fall 2019   14 students
    Fall 2018   10 students

University of Puerto Rico Mayagüez, Department of Biology
Principles of Ecology, Undergraduate, 3 credits, 30 students, Fall 2017; Spring 2015; Fall 2014
*Quantitative Ecology in R, Graduate, 3 credits, 15 students, Spring 2016
*Population Ecology in R, Graduate, 3 credits, 15 students, Fall 2016
Introduction to Biology for Majors, Undergraduate, 3 credits, 50 students, Fall 2014, 2015

Pima Community College, Desert Vista, Tucson, Arizona
Introduction to Biology for Non-Majors, 3 credits, 25 students, Fall 2012

SERVICE

Reviewer	American Naturalist, Annals of Botany, Biotropica, Ecography, Ecology, Ecology Letters, Functional Ecology, Global Ecology and Biogeography, Journal of Animal Ecology, Journal of Biogeography, Journal of Ecology, Journal of Vegetation Science, Nature, Oecologia, Oikos, PLoS ONE, Perspectives in Plant Ecology, Evolution and Systematics; Proceedings of the Royal Society B, Science, among others

NSF Review Panels – Directorate of Biological Sciences:
2016 (2); 2018 (1); 2019 (1); 2020 (1, ad hoc); 2021 (2); 2022 (2); 2023 (2 scheduled)

Alberta Conservation Association Grants in Biodiversity (1); ForestGEO Research Grants Program (1); Canada Foundation for Innovation (1)

Faculty Committees	*Department of Biology Diversity, Equity, and Inclusion Committee* (Fall 2020-present): Evaluate existing and consider new strategies for increasing DEI in the Department; developed a mission statement and recommendations for the Department, moved to make *ad hoc* committee a standing committee.

Department of Biology PhD Prospectus Committee (2019–2022): Part of a team of four faculty who prepared and submitted a proposal for the creation of a PhD in Biosciences program. Proposal approved by Dean, Provost, now under review by the State Council of Higher Education for Virginia.

Department of Biology Graduate Academic Committee (Spring 2018; Fall 2019; Spring 2020): Reviewed and approved graduate applications; reviewed graduate application requirements, reviewed new graduate course proposals. I advocated for eliminating the Graduate Record Examination (GRE) requirement, unanimously approved by the Department.

Workshops Convened	2019	[Explore NEON, Virginia Commonwealth University](#), 30 participants. Access and analyze NEON data in R.
	2019	investigadoresACG Open House, Area de Conservación Guanacaste, Costa Rica, Organizing Committee, 60 participants (researchers, land managers, and environmental educators)
	2018	[Data Carpentry R for Ecology, University of Puerto Rico Rio Piedras](#), 25 participants. Data management, reproducibility and analysis
	2018	NSF Macrosystems in Biology Principal Investigator (PI) Meeting, Organizing Committee, 80 participants
	2016	Data Carpentry R for Ecology, University of Puerto Rico Mayagüez, 20 participants. Data management, reproducibility and analysis

Diversity in STEM	2021	Ecological Society of America Strategies for Ecology Education, Diversity and Sustainability, VCU chapter faculty advisor (2021–), underrepresented minority mentoring and research and career training
	2022	Women of Color in Ecology and Evolutionary Biology Mentor Program

	2019	Científico Latino Graduate Student Initiative, faculty mentor
	2018	Ecological Society of America Annual Meeting SEEDS faculty mentor
	2017	ESA SEEDS, new UPRM chapter, faculty advisor (2014–2017)
	2010	Women in Science and Engineering mentor
Invited Public Outreach	2021	Henrico County Public Schools Hispanic Heritage Month Keynote (bilingual), Científiques como tú: Innovation Depends on Diversity
	2021	Roots and Shoots Puerto Rico Pollinator Week (in Spanish), La diversidad de las mariposas de Puerto Rico

PROFESSIONAL DEVELOPMENT

2022	*2022 Virginia Commonwealth University Faculty Success Program Cohort* Presented by the National Center for Faculty Development & Diversity. A 12-week program to implement skills and strategies for research productivity and work-life balance, including accountability, coaching, and peer support.
2021 - 2022	*National Ecological Observatory Network Ambassador Program* Accelerating scientific discovery, diversity, and inclusion through NEON data.
2021 - 2022	*Institute on Inclusive Teaching, Virginia Commonwealth University* Strategies for becoming more inclusive instructors and leaders. A sustained, year-long process of design, application, and assessment of these strategies.
2019	*NSF Jumpstart: Reintegrating Biology, Austin, TX* Explored questions and new developments at the crossroads of modern biology. Resulted in publication (McEntire...Hulshof et al. 2021).
2019	*Virginia Commonwealth University Grant Writing Academy* Writing workshops for grant preparation, led to funded NSF CAREER award.
2017	*Data Carpentry Instructor Training, San Juan, PR* Inclusive pedagogy, instructional design.
2016	*NEON Data Science Institute, Boulder, CO* Remote sensing using open-source tools and reproducible science approaches.
2016	*Quantitative Undergraduate Biology Education and Synthesis (QUBES) and Ecological Society of America Faculty Mentoring Network 'Scaling Up: Bringing Research Data into Undergraduate Classrooms' program*

PROFESSIONAL AFFILIATIONS

American Association of Hispanics in Higher Education
American Geophysical Union
Association for Tropical Biology and Conservation (including Neotropical Chapter)
Association for Women in Science
Ecological Society of America (including Latin American & the Caribbean Chapter)

LANGUAGES

English – native language; Spanish – fluent

Cover Letter

PDF

Download link	https://aprecruit.ucr.edu/analyst/applications/59964/documents/12514
Filename	Cover_Letter.pdf (202 KB)
Uploaded	Dec 18, 2022 at 8:24am

18 December 2022

Dear Dr. Santiago and the Faculty Search Committee,

I am pleased to submit this letter of interest for UCR's position of Assistant Professor in Plant Community Ecology. As an assistant professor of Biology at Virginia Commonwealth University, I study the coupling between climate change and plant community assembly in tropical and temperate mountain landscapes. As a Chicana, I use my experience at the intersection of cultures and languages to challenge barriers to diversity in STEM. At UCR, I would look forward to intensifying my pursuit of interdisciplinary collaborations and to catalyzing new frontiers at the nexus of plant ecology, environmental data science, and conservation biology.

Throughout my career, I have leveraged lateral thinking, combined with traditional field-based and data-driven analytical tools, to resolve long-standing questions, reconcile paradoxes, and upend assumptions. By coupling ideas from across intersecting disciplines, my research yields insights into how environmental variability underlies contemporary and future plant community assembly. My early work, published in *Functional Ecology* and *Global Ecology and Biogeography*, revealed patterns and drivers of plant diversity across elevation and latitude. My ongoing work examines the impact of climatic variability on mountain biodiversity, including by building a monitoring network, Proyecto ALTA (Altitudinal Transects across the Americas). ALTA aims to develop cost-effective solutions for tracking plant dispersal and migration, climate adaptation, and modeling climate vulnerabilities (from species to ecosystems) across temperate and tropical mountains. The iconic mountains of California could serve as exciting test beds for ALTA and I expect this work would foster collaborative research relationships across and beyond Botany and Plant Sciences at UCR.

Solving complex planetary challenges requires interdisciplinary (and equitable) collaborations, and I have long been passionate about fostering such partnerships. To help scientists discover and connect to new collaborators worldwide, in 2022 I co-founded Collaboratory, an online platform currently being considered for a Moore Inventor Fellowship. I am dedicated to attracting and empowering underrepresented students to ecology, so have founded Ecological Society of America Strategies for Ecology, Education, Diversity, and Sustainability (SEEDS) chapters in Puerto Rico and Virginia. My NSF CAREER award also supports the creation of an environmental data science startup (ecoCode) under the umbrella of SEEDS. I would be excited to collectively build this startup alongside the UCR SEEDS chapter, including by forging partnerships through the Center for Conservation Biology and Center for Integrative Biological Collections.

Quantitative skills are central to designing equitable and sustainable futures, and yet inequitable access to training opportunities creates barriers to meaningful participation by marginalized communities. I have purposefully designed my teaching portfolio around quantitative skills so as to democratize access to science and ensure the communities most impacted by climate change can participate in re-envisioning and re-constructing future worlds. At UCR, I am well positioned to teach a range of plant ecology, community ecology and data carpentry courses to prepare students for interconnected global societies.

In short, my collaborative and innovative research and teaching record, and my demonstrated commitment to equity and inclusion make me an excellent candidate for your position. As requested, I've included reference information below, and am at your disposal should you have additional questions. I can most easily be reached at cmhulshof@vcu.edu or on my cell: (787) 979 0445. Thank you for considering my application,

Catherine Hulshof, Ph.D.
cmhulshof@vcu.edu // biodiversityresearchlab.com

The following scholars have agreed to write letters of recommendation on my behalf:
Dr. Chris Gough (collaborator, colleague), Virginia Commonwealth University, cmgough@vcu.edu
Dr. Jennifer Powers (collaborator), University of Minnesota, powers@umn.edu
Dr. Nishi Rajakaruna (collaborator), California Polytechnic State University, nishi.rajakaruna@gmail.com

Statement of Research

PDF	Download link	https://aprecruit.ucr.edu/analyst/applications/59964/documents/12515
	Filename	Research_Statement.pdf (309 KB)
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Biodiversity and climate change: coupled systems

Biodiversity and climate change are fundamentally interconnected but, in practice, are addressed mainly by separate disciplines. My research uses intersectional thinking (combining ideas at the intersection of disciplines) to understand the connections between the two. This includes the impact of climate change on plant diversity, climatic-induced shifts in plant traits and distributions, the reassembly and altered dynamics of ecological communities, and subsequent impacts on ecosystem function. I deliberately study mountains because biodiversity and climate change patterns there are particularly complex, and they offer opportunities to understand emergent global phenomena. This creative approach, combined with field-based and data-driven tools, allows us to explore the coupling between climate change and biodiversity and identify overlooked feedbacks and untested assumptions at the intersection of plant ecology, environmental science, and geoscience.

Specifically, I study the impact of elevation-dependent climate change on the structure and function of tropical and temperate mountain flora across a range of spatial (plot to continental), temporal (decadal), and biological (organismal to ecosystem) scales. My research explores the capacity and limits of plants to respond to climate change, the resilience of forests under climate change, and the interactions between climatic and edaphic (soil) properties on the reassembly and altered dynamics of mountain landscapes.

My work often uncovers research questions tested predominately in one system or field and expands it to another to generate novel insight into the generalizability of complex ecological systems. Doing so creates opportunities for new research and cross-disciplinary collaborations.

Past Work: Bridging disciplinary divides to monitor and predict climate change impacts

My past work highlighted the diversity of plant function across climatic and edaphic gradients in space (elevation, latitude; Hulshof et al. 2013) and time (during succession; Buzzard et al. 2016). My work challenged common assumptions by emphasizing intraspecific trait variation when functional ecology was dominated by measurements of the mean (Hulshof and Swenson 2010). This is important because trait variance predicts the resilience of species and ecological communities to climate change. By focusing on trait variance, my work provided insight into tropical forest plant diversity (Hulshof et al. 2013), detected signatures of climate change in tropical forests (Hulshof et al. 2020), and identified the vulnerability and resilience of tropical butterflies to climate change (Echevarría and Hulshof 2019; Hulshof et al. *In Prep*).

Despite a widespread appreciation that trait variation is significant (Violle, Hulshof et al. 2011; McEntire, Hulshof et al. 2021), a predictive theory of trait variation across spatial, temporal, and biological scales is lacking. In response, I synthesized existing empirical models that can quantify trait variation across scales, advancing trait-based ecological theory (Hulshof and Umaña 2022; Umaña and Hulshof *Under Review*).

In addition to the impact of climate on plant trait variation, I demonstrated the role of climatic and edaphic properties on plant diversity and their importance for conservation (Hulshof and Spasojevic 2020). This is a novel contribution because we show that edaphic factors interact with climate to drive plant diversity and thus climate change responses. More importantly, we outlined ecological and evolutionary mechanisms by which soils structure plant communities. These findings are particularly relevant for unusual soils like ultramafic (or serpentine) soils characterized by high endemism despite presenting challenges for plant growth. Although ultramafic ecosystems are model systems, most of our understanding of these systems comes from Mediterranean and temperate climates. This raises questions about the generalizability of plant responses to ultramafic soils in tropical latitudes. Indeed, our recent synthesis challenges dominant paradigms constructed in temperate latitudes by demonstrating the diversity of plant form and function in tropical ultramafic ecosystems (Garnica Díaz et al. 2022; Samojedney et al. *Accepted*). Ultramafic ecosystems are studied in many cross-disciplinary contexts, including understanding Martian ecosystems and life on early Earth. These cross-cutting themes intersect research across UCR's campus and I would be

excited to explore new collaborations centered around ultramafic systems as novel macroecological models for studying climate-soil-plant interactions at global scales.

Future work: Towards planetary-scale biodiversity monitoring and forecasting

My previous work in tropical and temperate mountains revealed patterns and underlying drivers of plant community assembly and responses to climate change. Yet understanding the future re-assembly of communities in light of climate change requires an even more nuanced understanding of the impact of climatic variability on traits related to dispersal, physiological tolerance, growth, and survival. This is the focus of my recently launched NSF CAREER-supported multi-year and multi-site project (Proyecto ALTA).

Proyecto ALTA (Altitudinal Transects across the Americas) will help us track elevation-dependent warming. This network will integrate forest dynamics plots across tropical and temperate mountains, field-based measurements of plant physiological tolerance, and remote and hyperspectral imagery in Costa Rica, Puerto Rico, Virginia, and Tennessee. As it grows, this network could encompass other mountain ranges in the western United States and Mexico. Through this project, I aim to disentangle the mechanisms that shape plant diversity and ecosystem functioning, thus allowing us to track climatic-induced shifts in the distribution of species, forests, and entire biomes.

To be most effective, broadly adopted, and sustainable, biodiversity monitoring should be inexpensive and open to all: I envision ALTA as a stepping-stone to such a future. ALTA is a platform for developing and deploying low-cost solutions for biodiversity monitoring. I am hopeful these strategies will make it easier and less costly to expand to other sites and collaborators (such as the Sierra de Manantlán Biosphere Reserve in Mexico, a collaboration I am currently exploring). At UCR, I would pursue partnerships through the Center for Conservation Biology, the Center for Integrative Biological Collections and Riverside's startup incubator, ExCITE, to develop affordable sensors (i.e., an all-in-one weatherproof smartphone or Rasberry Pi-powered camera trap, acoustic recorder, and climate datalogger). This next generation of biodiversity monitoring will detect responses to changing climates at local to global scales using a combination of field-based methods and novel technologies such as artificial intelligence and remote sensing. And yet it is still 'lite' enough to be available in resource-limited areas, the context of most regions experiencing the greatest climate impacts. In the long term, further work envisioning a more democratic future of Earth monitoring could be supported through NSF's *Science and Technology Centers: Integrative Partnerships* program.

While ALTA sites share a similar methodology, each site has distinct research priorities driven by local knowledge holders (i.e., land managers, private landowners, etc.). For example, in Area de Conservación Guanacaste (ACG), Costa Rica, I am using satellite imagery to detect ecotones between tropical wet and dry forests (Walters, Atkins and Hulshof *In Prep*). Ecotones are diverse and dynamic, control the flow of energy and organisms, and serve as windows into the structure and function of future forests. Monitoring of seedling and adult tree communities and their physiological responses to water availability and temperature will allow us to predict 1) which dry forest species can expand into drying wet forests and, conversely, 2) which wet forest species tolerate drier conditions and 3) how these changes in forest composition, in turn, impact ecosystem function.

The range of questions we hope to ask across ALTA sites intersect climate modeling, ecosystem ecology, community ecology, plant physiology, remote sensing, and land management and create many collaborative research and engagement opportunities. Through ALTA, I would look forward to facilitating collaborations across UCR. Funding from various NSF programs could support these collaborations, including the cross-directorate and international *Biodiversity on a Changing Planet* and the *Organismal Responses to Climate Change* programs which both require integrative, cross-disciplinary approaches. In addition, expanding cross-border research by recruiting and collaborating with Mexico's CONACYT-funded graduate students and PIs would be a priority if my lab were based at UCR.

Statement of Teaching

PDF	Download link https://aprecruit.ucr.edu/analyst/applications/59964/documents/12516
	Filename Teaching_Statement.pdf (110 KB)
	Uploaded Dec 18, 2022 at 8:28am

Innovations in data science are disrupting industries and are predicted to help solve major societal challenges of climate, food, energy, and health. The emerging challenge in education is to train diverse students for skill sets, technologies, and, ultimately, careers that don't yet exist for a world whose global processes and economic paradigms will fundamentally differ from those of today. Although data science has disrupted and transformed scientific discovery, it has come at the cost of a widening skill gap, reflecting socioeconomic differences and determining who gets to participate in re-imagining and re-constructing future worlds. Through my teaching, I aim to 1) lower barriers to STEM careers by designing my teaching portfolio around open science and data science and 2) foster creativity for developing climate and sustainability solutions. This approach would be well suited for developing exciting new courses that cross disciplines and prepare future leaders at the nexus of ecology and biodiversity science.

My teaching is centered on using intersectional thinking, systems approaches, and connecting research and practice for societal transformation. This approach is inherently centered around active learning and has the additional benefit of creating meaningful learning experiences tailored to student career interests. For example, I have developed a wide range of activities and assignments that promote active learning in undergraduate and graduate courses by adopting 'I do, we do, you do' exercises, student-driven curricula (Choose Your Own Adventure assignments), and other pedagogical techniques that empower learners.

A substantial amount of learning occurs outside the classroom too. One example of my commitment to re-envisioning undergraduate education is ecoCode, an initiative supported by my recent NSF CAREER award. ecoCode re-envisions the traditional undergraduate course-based learning experience by transforming a SEEDS chapter into a startup where students work collectively to identify climate and sustainability challenges and propose and test solutions. I am designing ecoCode as a reproducible model for adoption by other U.S. chapters. I foresee ample potential for ecoCode to learn from and contribute to the many resources across UCR. Once it is a proven concept, I envision launching ecoCode as an REU program serving as an effective on-ramp to ecological sciences; this could be deployed in collaboration with the UCR Natural Reserve network.

Rapidly evolving tools and technologies, coupled with the need to increase science equity and accessibility, also necessitate novel approaches to curriculum development. Emerging research indicates collaboratively-designed curricula can harness expertise across disciplines in ways traditional courses cannot. Doing so can better prepare students for a rapidly changing, more interdisciplinary world. In line with this imperative, I am designing a semester-long undergraduate environmental data science course with content support from the National Ecological Observatory Network. We hope to make it easier for new and existing faculty to teach environmental data science without being an expert in data science or data science pedagogy, ensuring data science training is accessible to all. We anticipate this course becoming a national model by offering 'train the trainer' workshops at NSF's Environmental Data Science Innovation and Inclusion Lab, or in collaboration with the Ecological Society of America. At UCR, I would look forward to building on this work and exploring new collaborations with the on and off-campus community.

I would also be enthusiastic about exploring opportunities to co-teach and developing courses that marry elements of ecology and environmental data science with elements for designing effective climate science visualizations for the public and policymakers. This could include, for example, a Climate Data Design course centered on visual frameworks that influence policy and human behavior. Other course ideas that blend intersecting disciplines include 'OpenEarth' where students design low-cost climate and biodiversity monitoring sensors that could be tested and deployed across our ALTA network or 'Envisioning Future Earth' where we collectively imagine sustainable, diverse, interconnected futures. Topics could include Afrofuturism, Traditional Ecological Knowledge, financial literacy and rewriting imposter syndrome narratives. Such courses would allow me to pursue my commitment to integrate creativity and ecology in order to actively challenge assumptions about who does science, and how and where it is carried out.

⚖ **This applicant's basic qualifications have not yet been evaluated.** Basic qualifications should be determined before further review.

Statement of Past and/or Planned Future Contributions to Advancing Diversity and Inclusive Excellence

In a "Statement of Past and/or Planned Future Contributions to Advancing Diversity and Inclusive Excellence", we ask applicants to describe their past and/or potential future contributions to promoting a diverse, equitable, and inclusive environment, which is a key requirement of the role of every faculty member and administrator at UCR. There are numerous ways to contribute, and a commitment to this part of our mission can be reflected through research, teaching, supervision, mentoring, community engagement, service, and any of the other varied activities that are a part of an academic career.

PDF	Download link	https://aprecruit.ucr.edu/analyst/applications/59964/documents/12517
	Filename	Diversity_Statement.pdf (209 KB)
	Uploaded	Dec 18, 2022 at 8:29am

Diversifying science is an integral component of my research and teaching philosophy. Given the vast planetary transformations and the underrepresentation of minorities in STEM, diversifying science can generate novel ideas and climate solutions by and for those most impacted by climate change. For this reason, collaboration with diverse researchers and increasing the visibility and accessibility of science have been, and continue to be, central to my academic career.

In my research, I purposefully create networks of diverse scientists and practitioners. For example, I invited a 16-strong international team of early-career researchers working and living near tropical ultramafic ecosystems to contribute to our synthesis of these biodiverse regions (Garnica Díaz et al. 2021). Our central aim was to identify climatic and edaphic interactions in tropical ultramafic ecosystems and how these interactions differ from and contradict patterns and theories established in temperate and Mediterranean climates. In another example, I am designing Proyecto ALTA (Altitudinal Transects across the Americas), a platform for diverse collaborations across disciplines. By creating research built upon inclusion and open science, I hope to attract diverse researchers interested in building and contributing to our network of people, ideas, and climate solutions. The resulting network will become a benchmark for monitoring elevation-dependent climate change in understudied and underfunded systems and for building strategies for inclusive community outreach and engagement. As part of ALTA, I co-founded Collaboratory, a platform where scientists can identify, and connect with, potential collaborators. To support this effort, I recently submitted a proposal to the Gordon and Betty Moore Inventor Fellowship Program and will soon apply to the NSF Seed Fund (SBIR). I look forward to identifying opportunities for these efforts to forge connections with scholars at UCR and in the broader California community.

In addition to cultivating diverse collaborations, my research and teaching portfolios are deliberately designed around data science and open science (e.g., using and generating open-source data and educational resources) because these tools and skills can facilitate creative problem-solving, generate novel ideas, challenge convention, and increase upward mobility. Much of my research is designed in collaboration with, or involves the training of, underrepresented minorities, many of whom have continued pursuing careers in ecology or science policy. For example, former undergraduate student Echevarría Ramos quantified trait variation of the non-migratory Puerto Rican monarch. She was awarded research and travel funding to present her work at the Association for Tropical Biology and Conservation and later published her work in *Biotropica* (Echevarría and Hulshof 2019). Her work served as preliminary data for a competitive funding opportunity (Puerto Rico Science, Technology, and Research Trust) which supported an island-wide initiative to digitize and DNA barcode moth and butterfly museum collections (Hulshof et al. *In Prep*). This digitization campaign helped forge new collaborations with researchers and conservation programs such as the Smithsonian Institution National Museum of Natural History, the McGuire Center for Lepidoptera & Biodiversity at the University of Florida, Para La Naturaleza, and iDigBio, an NSF-funded biodiversity collection digitization network. My lab is now working towards developing an open-source tool 'AI for Butterflies' to extract wing traits from millions of digitized museum specimens. Such a tool could lead to new discoveries of butterfly wing size and color patterns across the world. Currently, I am mentoring Aura Alonso (PhD Student, University of Vermont) on a Puerto Rico moth barcoding initiative and Cat Terry (undergraduate, VCU) on a review of post-colonial Lepidoptera research in Puerto Rico and have connected both students to collaborative opportunities at the Smithsonian, where I serve as a Research Associate. Thus, my research intentionally creates meaningful training opportunities for students from diverse backgrounds and I would look forward to expanding these efforts if based at UCR.

My commitment to equity and inclusion is also evident in my teaching. In my courses, I use weekly 'Scientist Spotlights' to highlight underrepresented scientists (across Project Biodiversify and drawn from my own diverse and international network) to ensure diverse populations see themselves and cultivate a sense of belonging in STEM. I integrate my experience as a Chicana (Mexican American) into discussions of why community, collaboration, and a sense of belonging in science are important. My courses also

demystify the hidden curriculum by developing both hard (programming, data literacy) and soft skills (leadership, confidence, networking, team science) underrepresented students will need to thrive in their careers, whether in academia or other sectors. Just as my research requires me to stay current with the rapidly changing tools and data streams in ecology, teaching that is socially- and culturally-relevant also requires continual learning of evolving best practices. I have achieved this by participating in teaching communities such as the ESA supported Quantitative Undergraduate Biology Education and Synthesis (QUBES) Faculty Mentoring Network 'Scaling Up: Bringing Research Data into Undergraduate Classrooms' program, which expanded my ability to make learning more inclusive while teaching quantitative skills. In 2021, I also participated in the Institute on Inclusive Teaching at VCU. The Institute was an intensive week-long training on strategies and techniques for addressing the inclusiveness of courses and curricula followed by a sustained year-long process of designing, implementing and assessing these strategies with other faculty. My inclusive teaching strategies help address issues of access to educational opportunities (e.g., by using low- or no-cost textbooks), student engagement in the classroom (allowing different participation modalities), student retention and success (empowering students by emphasizing a growth-mindset), and classroom and institutional climate (facilitating collaboration, community, and social good). These inclusive teaching strategies position me as an instructor who provides meaningful learning experiences centered around discovery through data, inclusion, innovation, and empowerment.

Outside the classroom, I have founded and advised two Ecological Society of America SEEDS (Strategies for Ecology, Education, Diversity and Sustainability) chapters, first at the University of Puerto Rico Mayagüez (2014-2017) and Virginia Commonwealth University (2021-present). Many SEEDS students I mentor have gone on to pursue graduate degrees and other ecological professional opportunities. My NSF CAREER award will support the development of a startup and think tank, ecoCode, under the umbrella of SEEDS, to support research and training experiences for underrepresented students in ecological data science. I would be excited to launch this in collaboration with the UCR SEEDS chapter. By nesting ecoCode under SEEDS, I hope to cultivate community (key to retention), connect students to career, internship, and networking opportunities, and build a reproducible model for adoption by other chapters across the United States.

In the larger community, I engage and motivate diverse 6-12 grade students to pursue STEM careers. My invited keynote talk during Richmond Public School's Hispanic Heritage Month 2021 focused on pathways to STEM. We know representation matters and, as one of the 5% of Hispanic faculty across the United States, I have shown the disparity between faculty diversity and student diversity is large, especially in regions with majority-minority populations. In short, collaborating alongside the vibrant UCR community on and off campus would be a priority for my diverse lab group if based in Riverside.

Dr. Jennifer Powers

Professor, University of Minnesota, Department of Ecology, Evolution and Behavior

PDF	Download link	https://aprecruit.ucr.edu/analyst/applications/59964/references/183739/file
	Filename	Powers_letter_for_Hulshof_UCR.pdf (356 KB)
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	Address	306 Ecology 1987 Upper Buford Circle St. Paul, MN 55108

UNIVERSITY OF MINNESOTA

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January 9, 2023
powers@umn.edu

Search Committee
Department of Botany and Plant Biology
University of California, Riverside

Dear Search Committee:

It gives me great pleasure to recommend Dr. Catherine Hulshof de la Peña (Cathy) for your advertised position of Assistant Professor of Plant Community Ecology at the University of California at Riverside. I have known Cathy since she was a graduate student working at the Área de Conservación Guanacaste in Costa Rica, and we have collaborated on research and outreach over the years, including the DOE-funded project on modeling tropical dry forests that I coordinated. Based on our fourteen+ years of collaboration, I can confidently say that she would be a great addition to any Department. Cathy is currently an assistant professor at Virginia Commonwealth University, coming there after several years at the University of Puerto Rico, Mayaguez. She had an NSF-funded postdoctoral fellowship at the University of California-Davis, and received her PhD in 2013 from the University of Arizona. Thus, she already has experience balancing research, teaching, and service, and would be able to "hit the ground running". Her research themes are too broad to pigeon-hole into one category, as they integrate and span the fields of plant functional traits, plant-insect interactions and evolution of these relationships, and edaphic specialization of plants on serpentine or unusual soils. Below I elaborate on several characteristics of her research, teaching, and mentoring, which distinguish her as an outstanding potential colleague for your Department.

As is reflected in her CV and essays, Cathy has shed new light on fundamental questions in ecology and evolution, and her **innovative** studies have overturned many of our implicit or overlooked assumptions. For example, the use of functional traits to model ecosystem processes and understand how environmental factors constrain interspecific variability plant distributions and dynamics has been an increasing common tool. However, few researchers have actually quantified phenotypic plasticity in functional traits and how many samples are needed to adequately represent a species with a single value of a trait. Cathy's 2010 Functional Ecology papers was among the first papers to measure the magnitude of trait variation within and among species, and suggests that more samples per species are needed to account for intraspecific
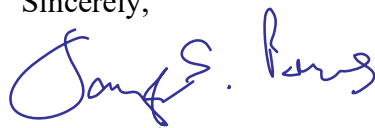
variability. Her subsequent work expanded on these themes and applied functional trait analysis to classic questions in the literature such as "are mountain passes higher in the tropics?"

In addition to being innovative, her work is **independent.** She has pursued and received funding from the US National Science Foundation for her PhD (receiving a prestigious Graduate Fellowship), postdoctoral fellowship, and recent NSF Macrosystems Biology and CAREER grants---independently of her academic advisors and mentors. Her current projects include investigating how plant diversity and functional traits vary over soil gradients and unusual soils, and the consequences of this variation for communities of Lepidopteran herbivores, and the demographic processes that drive species expansion and contraction along elevational gradients. This **integrative** quality is really the hallmark of Cathy's work. The other theme that is woven through all of her studies is a heavy focus on quantitative ecology, statistics, and data science. Her recent paper on trait variance across scales, which appeared in Global Ecology and Biography, exemplifies this.

In addition to her research, Cathy is also a **gifted teacher and mentor**. She currently teaches a variety of courses at VCU, but she focuses on teaching computational approaches in ecology and how to use "big data". Her teaching is marked by innovation and a sense for what skills will be marketable for students from a range of backgrounds. Cathy is also a dedicated mentor to junior scientists, and is especially interested in promoting the careers of students from groups that are under-represented in ecology. A Chicana, she has written extensively about the challenges and opportunities facing Hispanics and Latinx students in her blog (https://biodiversityresearchlab.com/field-notes). Her philosophy for recruitment is best encapsulated by this message on her website: "When recruiting new lab members, I look for diverse perspectives, creative ideas, and problem-solving skills over exam scores and grades."

In short, I urge you to strongly consider Cathy's application. Her research is innovative, independent, and integrative. She is an excellent example of the new generation of biologists--- who use sophisticated tools and approaches to examine multiple feedbacks among plants, the soils they live on, and the herbivores who feed on them. Her teaching and mentoring are distinguished, while serving as a mentor for women of color. If there is anything else that I can do to facilitate her application, do not hesitate to contact me. Thank you for your attention.

Sincerely,

Jennifer S Powers, PhD
Professor

Dr. Chris Gough

Associate Professor, Virginia Commonwealth University, Department of Biology

PDF

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Filename	Hulshof_job_reference_2023.pdf (104 KB)
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Address	Department of Biology 1000 W Cary St #126 Richmond, VA, 23284

VCU Biology
College of Humanities and Sciences

Christopher M. Gough, Associate Professor of Biology
College of Humanities and Sciences
Department of Biology
1000 West Cary Street
Box 842012
Richmond, Virginia 23284-2012

Dear Search Committee:

This letter offers the strongest endorsement of Dr. Catherine Hulshof for the open faculty position in your program. As a close colleague of Dr. Hulshof in VCU's Biology Department, I know her scientific accomplishments and impact well. She and I have collaborated on research projects, co-authored a scholarly publication, and advised undergraduate and graduate students together.

Dr. Hulshof's scholarship seeks to understand how biological diversity and the environment shape one another, and affect organisms, populations, and ecosystems. Her work is crucial to determining what sustains biological diversity, and provides essential evidence-based guidance for policy makers, land-use managers, and conservationists. Dr. Hulshof's scholarly work is impressively far-ranging and -reaching, extending from the tropics to boreal forests and including plants and insects. Moreover, as a consummate scholar and sought-after collaborator, Dr. Hulshof's work spans theory, observations, and modeling, and engages a large network of international scholars. Such collaboration has resulted in papers recently published with in top STEM journals, including the *Proceedings of the National Academy of Sciences (Impact Factor, IF = 11.2)*. In short, Dr. Hulshof's impact and trajectory at an early career stage are exceptional.

Dr. Hulshof's scholarly achievements, impact, and level of productivity are outstanding. I focus on three supporting examples: 1) Dr. Hulshof has secured the largest National Science Foundation (NSF) grant in our department's history through a highly competitive and prestigious CAREER award; 2) her scholarship is internationally recognized and valued as evidenced through exponentially rising citations and impact metrics; and 3) Dr. Hulshof is leading the innovation of research training of underrepresented minorities (URMs) in STEM. I detail each of these points below.

1. Extraordinary success securing federal funding

Since 2016, Dr. Hulshof has secured as lead PI two National Science Foundation Grants totaling $1,306,000, one an Early Career Award and the second a >$1M CAREER award that necessitates integrates scholarship and research training. CAREER awards are among the most competitive and prestigious honors awarded to early investigators by the NSF and, because they are peer-reviewed, Dr. Hulshof's selection highlights her status as a renowned early career researcher by other – junior to senior – scholars and by program officers.

2. Impactful and prodigious research productivity

Dr. Hulshof's trajectory of publication in top-tier peer-reviewed journals and associated citations highlight her scholarly eminence among peers. In her decade-long early career, she has published 23 papers, including nine as lead author, which have received >2000 citations in total. Dr. Hulshof's scholarly prominence and influence is evidenced by an exponential increase in annual paper citations since arriving at VCU, reaching 442 in 2022 and contributing to an impressive h-index of 14.

3. Pioneering STEM research training of underrepresented minorities

An integral component of Dr. Hulshof's research and underlying success involves engaging, elevating, and amplifying the presence of URMs in STEM. As a Chicana investigator with the lived experience of a STEM URM and a passion for inclusivity, Dr. Hulshof is pioneering innovative ways to engage students of color in the ecological sciences, with recognition that diverse collaborators serve to enrich and enhance the sciences. Dr. Hulshof is approaching this challenge by advancing mentoring opportunities for underrepresented students, initiating research society chapters focused on URM research and career training, and organizing challenging but necessary 'incubator' discussions among faculty and students that seek to enhance the STEM identity of URM students. Rather than separating scholarship and research training, Dr. Hulshof is integrating the two and, as a result, pioneering and modernizing the teacher-scholar model, which advances research while training a diverse and inclusive future generation of STEM scholars.

In summary, Dr. Hulshof's outstanding achievements and innovative approach to science make her a phenomenal colleague and contributor to our faculty. While I will miss her contributions to our department, I have no doubt that Dr. Hulshof's excellence will translate into exceptional scholarship and teaching at your institution. Thank you for considering Dr. Hulshof's application.

Sincerely,
Dr. Chris Gough
VCU Associate Professor of Biology
http://www.people.vcu.edu/~cmgough/

Dr. Nishi Rajakaruna

Professor, California Polytechnic State University, Biological Sciences Department

PDF	Download link	https://aprecruit.ucr.edu/analyst/applications/59964/references/183741/file
	Filename	Catherine_Hulshof_UCR_Application.pdf (184 KB)
	Uploaded	Jan 3, 2023 at 10:33pm
	Address	California Polytechnic State University, San Luis Obispo, CA 93407

CAL POLY

College of Science & Mathematics
Biological Sciences

January 4 2023

Dear Selection Committee:

I am delighted to offer my strong and enthusiastic support for Catherine Hulshof's application for the position of Assistant Professor in Plant Community Ecology at University of California, Riverside (UCR).

Catherine is uniquely qualified for the position advertised and would be a great asset not just for UCR but also for advancing collaborative research in plant ecology across California. She has worked in both tropical and temperate systems exploring patterns and drivers of community assembly, with a special focus on the role climatic *and* edaphic factors play in generating and maintaining diversity. She has received multiple NSF grants for her research, including the prestigious NSF CAREER Award in 2021. Her ongoing research on the impact of climatic variability on mountain biodiversity, including the building of a monitoring network, Proyecto ALTA (Altitudinal Transects across the Americas), is timely and would generate ample opportunities for research collaborations within UCR and across California (and beyond). Her experiences and skills in areas of data science and macroecology, and her focus on understanding how both climatic *and* edaphic factors influence patterns of plant diversity sets her apart from those studying impacts of climate or edaphic factors on diversity. I believe this coupled approach is critical for better predicting effects of global change on California's plant diversity, especially given close to half of California's endemic plants are restricted to special ('harsh) substrates (*i.e.*, edaphic specialists). While predicting range shifts based on climate change is important, such predictions have limited value in terms of conservation planning, when many of California rare endemics also double as edaphic specialists. I believe that Catherine can provide the necessary expertise to further advance the UC-led research agenda on climate change effects on California's plant diversity, including those that have more restricted/patchy ranges due to their specialized substrate preferences. She has a first-rate publication record in high impact journals and has demonstrated her ability to generate funding through competitive federal grants. She has taught ecology and environmental/biodiversity data science at both the undergraduate and graduate level and has taken a strong interest in mentoring students, especially those from under-represented groups. She is dedicated to collaborative science, especially with those from under-represented groups, both in the US and elsewhere, as demonstrated repeatedly through her

projects and other professional and outreach endeavors. Her efforts on launching ALTA, ecoCODE, Collaboratory, Ecological Society of America Strategies for Ecology, Education, Diversity, and Sustainability (SEEDS) Chapters in Puerto Rico and Virginia, are clear indications of her broad training and interests in exploring factors and mechanisms that generate and maintain plant diversity and her deep commitment to training the next generation of ecologists, with the necessary quantitative skills, locally and globally.

In this letter, I have decided to stress more on her ability to foster global collaborations and mentor students based on personal observations I have made over the last decade. I first interacted with Catherine in 2013 when she wrote to me about joining her on an expedition to botanically unexplored serpentine outcrops in Santa Elena Peninsula in Costa Rica. She generously offered funding for this visit so that we can meet in person and discuss potential collaborations in the region. Given my long-term interests and experiences in serpentine ecology, she was eager to get me involved in a mentoring/advising capacity as well as to discuss opportunities for future collaborations. I was grateful for the offer, however, despite agreeing to join the expedition, I had to pull out at the last minute due to an unavoidable personal commitment. Two years years ago, Catherine reached out again to collaborate on writing a review exploring serpentine ecology of tropical and subtropical latitudes, an area that has gone largely unexplored compared to the extensive work done in Mediterranean and temperate systems. I was excited about getting involved in this project where she took the lead role in developing the topics to be addressed, including in inviting 17 authors from 11 countries. This was a massive effort which resulted in a recent publication in *The Botanical Review*, titled 'Global Plant Ecology of Tropical Ultramafic Ecosystems.' The first author was one of her recent MS students, originally from Columbia, now carrying out her Ph.D. in plant ecology at the University of Florida. Her commitment to generating diversity in STEM was central to the way she approached this review from planning the content to inviting researchers from multiple countries, especially those from the southern hemisphere, and carefully mentoring/guiding the student and foreign authors. Her caring approach to collaboration was key to the successful completion of the review which has gained significant attention in geoecology circles, especially in the tropics. More importantly, the paper has helped remind those of us working mostly in Mediterranean/temperate systems that shifts in climate are key to shaping patterns of plant-soil relations (*i.e*., not all serpentine systems work like those found in California 😊). More recently, Catherine invited me to collaborate on a project exploring variation in specific leaf area, a key functional trait, across adjacent serpentine and non-serpentine outcrops from California, The Mediterranean Basin, Puerto Rico, and South Africa. Again, she reached out to 11 plant ecologists from four universities in the US, Greece and South Africa, leading to an effective collaboration, resulting in a publication in *Plant*

Ecology and Diversity, titled '[Specific leaf area is lower on ultramafic than on neighbouring non-ultramafic soils](#).' What was unique about this effort was her approach to mentoring one of my undergraduate research students at Cal Poly in taking the lead role in doing the analyses and writing. She met with him on numerous occasions (via Zoom), and along with one of her previous graduate students, provided guidance every step of the way. I was impressed at how much time she spent with my student, when it was clear that she already had a full lab of undergraduate and graduate students of her own, all carrying out independent research under her supervision. Catherine is committed to generating the next generation of environmental scientists and in forming global collaborations through effective networking, and in involving students and scientists from under-represented groups. She has shown this commitment repeatedly through her professional endeavors throughout her career (see her CV).

On a personal note, I would love to have Catherine in California as she can take a leadership role in exploring the coupled effects of climate and soils on the diversity and ecology of California's rare and endemic plants. This area of research is critical for generating effective climate change models and conservation planning (_fyi_, current models do not incorporate soil preferences). Her long-term interests on the ecology of plants of serpentine and other 'harsh' substrates, and on mountain plants, will quickly help her generate many collaborations across California, especially given her broad skill set in plant, ecosystem, and landscape ecology, diverse research experiences in temperate/Mediterranean/tropical climes, and documented success in generating extramural funds, fostering collaborative research, mentoring students (hers and those of others), and getting her collaborative research published in high-impact journals.

I am pleased to offer my strong and enthusiastic support for Catherine's application. Please do not hesitate to contact me by email at nrajakar@calpoly.edu should you desire additional information regarding her candidacy for the position of Assistant Professor in Plant Community Ecology at UCR. Thank you for your careful consideration of her application.

Sincerely,

Nishanta Rajakaruna
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&
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