CARLA RESTREPO **Full Professor**

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EDUCATION AND TRAINING

Post-doctoral training. 1997-1999. University of New Mexico, Albuquerque, NM. Mentor: B. Milne
Post-doctoral training. 1996-1997. Stanford University, Stanford, CA. Mentor: P. Vitousek.
Post-doctoral training. 1996. University of Florida, Gainesville, FL. Mentor: C. S. Holling.
Ph.D. 1995. University of Florida, Edges, fruits, frugivores, and seed dispersal in a Neotropical Montane Forest. Advisor: Douglas Levey.
M.Sc. 1990. University of Florida, Cooperative breeding in *Semnornis ramphastinus* (Capitonidae), a frugivorous bird. Advisor: Peter Feinsinger, Co-advisor: Douglas Levey.
B.Sc. 1984. Universidad del Valle, Colombia, Diseminación de muérdagos por aves Advisor: Humberto Alvarez-Lopez.
Organization for Tropical Studies, San José, Costa Rica, *Tropical Ecology and Conservation*: 88-2 course. 1988.

A. PERSONAL STATEMENT

My research interests are diverse, reflecting to some extent my fascination for the diversity and complexity of tropical ecosystems and landscapes, including the processes that modify them. I have established a research program in Large-scale Ecology and Macro-ecology that often addresses questions spanning multiple disciplines, and requires the combination of field work, analytical techniques, quantitative methods, geographical information systems and remote sensing to understand the origin of this complexity, as well as its consequences on the diversity and functioning of tropical ecosystems. I explicitly recognize the role of space in the organization of ecosystems whether at local or regional scales, and the possibility for interactions between them largely facilitated by the increasing influence of humans on landscapes. My research has contributed to: (1) the fields of Landscape Ecology and Macro-ecology, (2) the development of tools and techniques for the study of landscapes, ecosystem processes, and communities at large scales, (3) the application of this knowledge to the conservation, management, and restoration of tropical landscapes, (4) the education of local communities through "*Informal Science Programs*" (see under Service / Synergistic activities), and (5) the *advancement of women and underrepresented minorities* in Science (see under Research and Students / Mentoring).

B. POSITIONS, SCIENTIFIC APPOINTMENTS, AND HONORS

Positions and Scientific Appointments

Visiting Professor, Universidad del Valle, Cali, Colombia, January 2020 – June 2020.
Full Professor, University of Puerto Rico-Río Piedras, PR, 2015-present.
Associate Professor, University of Puerto Rico-Río Piedras, PR, 2008-2015.
Assistant Professor, University of Puerto Rico-Río Piedras, PR, 2001-2008.
Research Assistant Professor, University of New Mexico, NM, 2000-2001.
Research Associate, Observatorio Sismológico del Suroccidente de Colombia-UV, Colombia, 1996-2005.
Research Coordinator, Reserva Natural La Planada, FES, Colombia 1992-1993.
Research Associate, Sociedad Vallecaucana de Ornitología, Colombia. 1986-1988.
Ecologist, Centro de Datos para la Conservación-CVC, Colombia. 1984-1986.

Honors, Awards, and Fellowships

Fulbright Fellowship. 2019.
Elective Member of the American Ornithologist Society. 2009.
National Science Foundation Minority Postdoctoral Research Fellowship. 1996-1998.
National Science Foundation Minority Graduate Fellowship. 1989-1992.
Jessie Smith Noyes Fellowship to attend Organization for Tropical Studies course. 1988.

C. RESEARCH

Publications

Thirty-eight (38) peer-reviewed papers, nine (9) book chapters, proceedings, or preprints, ten (10) non-academic publications. Four (4) undergraduate (‡) and twelve (12) graduate (†) students, and three (3) postdoc (*) coauthors. Major themes and selected publications are listed below.

The management of tropical landscapes for the sustainable production of ecosystem services requires thinking about resilience to account for disturbance and the increasing connectedness of natural-human systems.

Álvarez-Vargas, F. J.*, M. A. Villa Castaño, and **C. Restrepo.** 2022. Demand for ecosystem services in tropical small mountainous watersheds prone to landslides derive large-scale shifts in land-use. Remote Sensing 14: 3097.

Colon, J.‡ and **C. Restrepo**. 2019. Water quality and socio-economic indicators are linked in a tropical watershed: Emerging implications for the sustainable management of waterscapes**.** Wetlands 39: 1303–1316.

Sutton, L.* and **C. Restrepo**. 2013. Natural disasters, diverse economy and livelihoods in the Sierra de Las Minas, Guatemala. Journal of Latin American Geography 12: 137-164.

Delgado D.‡, M. Pérez, A. Galindo-Cardona†, T. Giray, and **C. Restrepo**. 2012. Forecasting the influence of climate change on agroecosystem services: Potential impacts on honey yields in a small-island developing state. Psyche: A Journal of Entomology vol 2012, Article ID 951215, 10 pages.

The large-scale dynamics of tropical mountainscapes mediated by landsliding may have profound consequences on the functioning and diversity of these environments that we are beginning to unlock.

Ramos-Scharron, C.*, E. Castellanos, and **C. Restrepo**. 2012. The role of shallow landslides in the downslope transfer of organic matter and its implications on the residence time of carbon in a tropical mountain system. Journal of Geophysical Research - Biogeosciences 117: G03016.

Restrepo, C., L. Walker, A. Shiels, R. Bussman, L. Claessens, S. Fisch, P. Lozano, G. Negi, L. Paolini, G. Poveda, C. Ramos-Scharron*, M. Richter, E. Velazquez. 2009. Landsliding and its multi-scale influence on mountainscapes. BioScience 59: 685-698.

Restrepo, C., P. Vitousek, and P. Neville. 2003. Landslides significantly alter land cover and the distribution of biomass: An example from the Ninole ridges of Hawai'i. Plant Ecology 166: 131-143.

Habitat fragmentation and invasive species are two main drivers of biodiversity loss. Focusing on species and communities, we have examined the complexities underlying biodiversity loss in tropical landscapes.

Delgado D. L.† and **C. Restrepo**. 2019. Multi-driver and multi-scale assessment of vine community structure and composition across a complex tropical environmental matrix. PLoS One 14(5): e0215274.

Delgado-Acevedo, J.† and **C. Restrepo.** 2008. The effect of habitat loss on body size, allometry, and bilateral asymmetry in two *Eleutherodactylus* species of Puerto Rico. Conservation Biology 22: 773-782

Cuervo, A.† and **C. Restrepo**. 2007. Assemblage and population-level consequences of forest fragmentation on bilateral asymmetry in tropical montane birds. Biological Journal of the Linnean Society 92: 119-133.

Restrepo, C., N. Gómez, and S. Heredia. 1999. Anthropogenic edges, treefall gaps, and fruit-frugivore interactions in a Neotropical montane forest. Ecology 80: 668-685.

Ecosystems and landscapes are complex and to understand the causes and consequences of this complexity it is necessary to develop new paradigms and tools.

Xu, L.†, E. J. Bedrick, T. Hanson, and **C. Restrepo**. 2014. Statistical tools for identifying modality in body mass distributions. Journal of Data Science 12: 197-215.

Allen C. R., A. S. Garmestani, T. D. Havlicek, P. A. Marquet, G. D. Peterson, **C. Restrepo**, C. A. Stowe, B. Weeks. 2006. Patterns in body mass distributions: Sifting among alternative hypotheses. Ecological Letters 9: 630-643.

Brown, J. H., V. K. Gupta, B-L. Li, B. T. Milne, **C. Restrepo**, and G. B. West. 2002. The fractal nature of nature: Power laws, ecological complexity, and biodiversity. Philosophical Transactions of the Royal Society of London Series B-Biological Sciences 357: 619-629.

Restrepo, C., L. M. Renjifo, and P. Marples. 1997. Frugivorous birds in fragmented Neotropical montane forests: Landscape pattern and body mass distribution. Pages 171-189, *in* W.F. Laurance and R. O. Bierregaard, Jr., editors. Tropical Forest Remnants: Ecology, Management, and Conservation of Fragmented Communities. The University of Chicago Press, Chicago, IL.

Grants

Thirty-one (32) grants (mostly as PI) to support research, training, and outreach activities. Funding sources include national government institutions, as well as national and international NGOs. First and latest grants received.

National Science Foundation, HRD Advance Catalyst, Catalyst: Virtual Observatory of Culture for Equity in Academia at the University of Puerto Rico Rio Piedras campus (VoCEA), 2023 (PI; Co-PIs Grisele Gonzalez and Carmen Maldonado), $2999,999

Puerto Rico Science and Technology Trust. Landsliding and rhizobiota link the short- and long-term carbon cycles: A "multi-omic" approach, 2022 (PI), $70,000

National Science Foundation, DEB Ecosystem Studies, Linking ecosystem and geomorphic processes to understand the large-scale dynamics of tropical mountains mediated by landsliding. 2016- (PI), $499,000, including two supplements to recover from Hurricane Maria ($97,416) and support a post-bac student (NSF-REPS, $41,405)

National Science Foundation, GEO-EAR, SGER: Development of a landscape approach for understanding the contribution of landsliding to carbon budgets: Using the Río Jones of the Sierra de Las Minas, Guatemala as a test watershed. 2009-2010 (PI), $40,000

Presentations

Seventy-two (72) invited talks at seminar and symposia; sixty-eight (68) and forty-nine (49) contributed papers and posters at national/international (5 by undergraduate, 21 by graduate and, and 4 by postdocs) and local (Puerto Rico; 31 by undergraduate and 18 by graduate students) meetings, respectively. Presentations by undergraduate students are the tangible product of their participation ($\geq$2 semesters) in the Supervised Research course and/or training programs.

D. TEACHING AND MENTORING

As an instructor and mentor, I thrive to unlock the potential of students and mentees, expose them to cutting edge knowledge and renown scientists, create safe spaces to give and receive criticisms, instill high standards, and educate about diversity and inclusion given the multiple worlds – being a majority in a Hispanic geography and a minority in a non-Hispanic geography - that they have to navigate. In the classroom I combine different teaching methods as well as types of assignments to provide a wide array of opportunities for students to excel. In most of the courses that I teach, students have to develop an original research project with the potential to become publishable.

Courses

Nine (9) new courses (2 at the undergraduate and 7 at the graduate level), four (4) revamped courses (1 at the undergraduate and 3 at the graduate levels). Sixteen (16) courses taught or co-taught (4 at the undergraduate and 12 at the graduate level). In addition, I have been instructor in field courses and workshops organized by me and others.

Students mentored

Five (5) undergraduate and six (6) M.Sc. and two (2) Ph.D. students have completed or are completing their degrees, including research under my supervision. Students have presented their work at meetings and most have, or are in the process, of publishing their work. In addition, ~ 60 undergraduate and 4 graduate students have participated in research projects conducted in my lab either through Supervised Research (BIOL 4990 and BIOL 6990) and training programs during the academic and summer terms.

Yakshi Ortiz. Ph.D. in Biology. University of Puerto Rico-Río Piedras, Puerto Rico. 2022-2023

Diana Delgado. Ph. D. in Biology. Disentangling Vine-Invaded Tropical Landscapes - From Individual Vine Patches to Vine Networks. University of Puerto Rico-Río Piedras, Puerto Rico. 2015

Ana Kilgore. M.Sc. in Biology. University of Puerto Rico-Río Piedras, Puerto Rico. 2022-present

Laura Ospina. M.Sc. in Biology. Does Functional Fiversity Influence Slope Stability? Investigating the spatial relationship between functional traits and landslide activity in a tropical mountainscape. University of Puerto Rico-Rio Piedras, Puerto Rico. 2019-present

Yakshi Ortiz. M.Sc. in Biology. Landsliding and Rhizobiota Link the Short- and Long-term Carbon Cycle through Silicate Rock Weathering. University of Puerto Rico-Río Piedras, Puerto Rico. 2021

Zuania Colon. M.Sc. in Biology. Efecto de la Temperatura sobre el Desarrollo de *Eleutherodactylus coqui*: Integración entre Mecanismos que Influencian el Fenotipo. University of Puerto Rico-Río Piedras, Puerto Rico. 2018.

Rodney Rodriguez. M.Sc. in Biology Land-use change and its impact on the butterflies of the "La Tula" watershed, Puerto Rico. University of Puerto Rico-Río Piedras, Puerto Rico.

Andrés Cuervo. M.Sc. in Biology. Does Landscape Fragmentation Influence the Phenotype? Testing the Variation in Bilateral Asymmetry, Morphology, and Feather Growth Rates of Tropical Andean birds. University of Puerto Rico-Río Piedras, Puerto Rico. 2005.

Johanna Delgado-Acevedo. M.Sc. in Biology. Effects of Land-use Change on the Morphology of Puerto Rican Frogs. University of Puerto Rico-Río Piedras, Puerto Rico. 2005

Zoraida Calle. M.Sc. Biology, Fenología y Regeneración Natural del Arboloco *Montanoa quadrangularis* Sch. Bip. Asteraceae en una localidad de los Andes Septentrionales: Implicaciones para su Uso en al Restauración Ecolgóica de los Bosques Andinos. Universidad del Valle, Cali, Colombia. 2002

Rachel Cruz-Perez. B.Sc. in Environmental Sciences. Root Tensile Strength Correlates with Abiotic and Biotic Conditions: A Macroecological Approach. University of Puerto Rico-Rio Piedras, Puerto Rico. 2021

Emily Diaz-Vallejo. B.Sc. in Environmental Sciences. Variation in below-ground ecosystem attributes along a topographic-fire matrix in a tropical mesic forest. University of Puerto Rico-Rio Piedras, Puerto Rico. 2018.

Josimar Figuroa. B.Sc. Interdisciplinary Studies. Enredaderas Invasoras y la Sostenibilidad de Paisajes Rurales en Puerto Rico., University of Puerto Rico-Río Piedras, Puerto Rico. 2014.

Johanna Colón. B.Sc. Environmental Sciences. Socioeconomic Change as Drivers of Water Quality Regime Shifts in the Río Grande de Arecibo Watershed. University of Puerto Rico-Río Piedras, Puerto Rico. 2009.

Andrés Cuervo. B.Sc. Effect of Habitat Fragmentation on Andean Birds: Body Size and Fluctuating Asymmetry. Universidad de Antioquia, Medellín, Colombia. 2002

Arlex Vargas. B.Sc. La Influencia de Claros de Bosque y Bordes de Origen Antropogénico en la Germinación y Crecimiento de Semillas de dos Especies de Arbustos Neotropicales. Departamento de Biología, Universidad de Antioquia, Medellín, Colombia. 1998

Postdocs mentored

Four postdocs have conducted, or are currently conducting, work under my supervision.

Francisco Alvarez. Demand for ecosystem services in tropical small mountainous watersheds prone to landslides derive large-scale shits in land-use.

Lindsey Sutton. Natural disasters, diverse economy and livelihoods in the Sierra de Las Minas, Guatemala.

Carlos Ramos-Scharron. The role of shallow landslides in the downslope transfer of organic matter and its implications on the residence time of carbon in a tropical mountain system.

Humberto Perotto-Baldiviezo. Landslides and the large-scale structure of tropical mountainscapes: Interactions with river networks and land-cover change in eastern Guatemala

E. SERVICE AND SYNERGISTIC ACTIVITIES

The long-term success of an institution relies on the contributions that their members make to the "social fabric" that sustains them at multiple scales. At my home institution, I actively participate in single-time (curricular development, strategic planning) and permanent (Academic Affairs, Graduate Program, Personnel, Communications, IACUC) committees, training programs, and mentoring student organizations. Outside my home institution, I routinely review manuscripts (41 journals) and proposals (ad hoc reviewer and panelist), and engage in mentoring activities.

Lead a diversity and inclusion effort to document and act on gender inequalities among STEM faculty at the University of Puerto Rico Rio Piedras campus. One tangible product of this effort is the report "Gender Inequality among Faculty at the University of Puerto Rico Río Piedras Campus – a ViDAS-VoCEA Report." 2020-2022

Taught a graduate course on sustainability at the Universidad del Valle, Cali, Colombia. The course entitled "*Sustainability, Resilience, and Landscapes: An alternative view to Understand the Provision of Ecosystem Services*" was attended by eight students that had to develop their individual project. To facilitate this process, I offered a workshop on Scientific Writing and GIS. 2020.

Integrated and shared my research work on landslides, livelihoods, and risks of natural hazards in Guatemala with peasants, local authorities, and NGOs directly affected and/or working on the mitigation of risks. 2016-ongoing

Developed an Informal Science Education Project in the village of Santa Rosalia, Guatemala. As part of this project I developed Summer Science Camps and a Citizen Science Program to teach about soil fertility, ecosystem traits, and landslides, and supported the creation of a group working around sustainability issues in Santa Rosalia. 2016-2019.

Lead and organized an ESA Organized Oral Session-Invasive vines: drivers of large-scale ecosystem shifts worldwide and consequences for restoration. 2015.

Lead, organized, and secured funding for the First Symposium-Workshop on Landslide Ecology-A Perspective from Tropical Mountains, ATBC, Kunming, China. 2006.

Contributed to the planning and execution of ESAs-Scaling UP: Future of Environmental Decisions Workshop. 2013.

Mentor for the Sociedad Ecoambiental, College of Natural Sciences, University of Puerto Rico-Rio Piedras. The students conducted research and outreach activities on sustainability and water use on the campus. 2010.