

# Helene C. Muller-Landau

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## EDUCATION

### Princeton University

Ph.D. 2001, Ecology and Evolutionary Biology. Dissertation committee: Simon A. Levin, Stephen W. Pacala, Stephen P. Hubbell, Henry S. Horn, Burton Singer

M.A. 1997, Ecology and Evolutionary Biology.

### Swarthmore College

B.A. 1995, Mathematics and Statistics, with a concentration in Environmental Studies. Graduated with Distinction. Phi Beta Kappa. Sigma Xi.

## PROFESSIONAL EXPERIENCE

**Staff Scientist**, and Lead Scientist for the CTFS Global Forest Carbon Initiative, Smithsonian Tropical Research Institute, Panama City, Panama. February 2008 to present. (*75% time through Feb 2010; 100% time thereafter.*)

**Visiting Scholar**, Department of Ecology and Evolutionary Biology, Princeton University. September 2015 – June 2016.

**Adjunct Professor**, Department of Ecology, Evolution and Behavior, University of Minnesota, Twin Cities. January 2008 to present.

**Assistant Professor**, Department of Ecology, Evolution and Behavior, University of Minnesota, Twin Cities. July 2004 to January 2008.

**Research Associate**, Ecology and Evolutionary Biology, Princeton University. Jan – Jun 2004.

**Post-doctoral Researcher**, National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara. 2002-2003.

**Post-doctoral Researcher**, Ecology and Evolutionary Biology, Princeton University. Fall 2001.

## FELLOWSHIPS, GRANTS AND AWARDS

National Science Foundation. “Dimensions US-China: Integrating functional, phylogenetic and genetic components of diversity for an improved understanding of forest structure, dynamics, and change.” (DEB 1545761) Jan 1, 2016 – Dec 31, 2017. \$296,240. Co-PI with PI S. Davies and co-PIs L. Comita, F. Jones, and N. Swenson.

Smithsonian Institution Competitive Grants Program for Science. “In forests globally, are large trees more sensitive to aridity?” 2015-2016. \$100,000. Co-PI, with PI K. Anderson-Teixeira and co-PI S. McMahon.

Smithsonian Institution Competitive Grants Program for Science. “Measuring the seasonal rhythms of leafing, flowering, and fruiting in tropical landscapes using unmanned aerial vehicles and computer vision.” 2013-2015. \$100,000. PI, with co-PIs K. Anderson-Teixeira, S. Bohlman, R. Condit, S. Davies, M. Detto, J. Hall, P. Jansen, S. Schnitzer, E. Tanner, and S. J. Wright.

Smithsonian Institution Competitive Grants Program for Science. “Species-specific effects of interannual climate variation on seed production and seedling establishment of tropical trees: A proposal to quantify patterns, test hypotheses, and project effects of future climate scenarios.” 2013-2015. \$99,828. PI, with co-PI S. Joseph Wright.

National Science Foundation. “Collaborative Research: LTREB RENEWAL – Long-term studies of flowering, fruiting and seedling recruitment in Neotropical forests: global change, climate variability and mechanisms of species coexistence.” (DEB 1122325 and 1122634) 2011-2016. \$450,000. Co-PI, with co-PIs N. C. Garwood, M. R. Metz, S. J. Wright, J. K. Zimmerman, N. G. Swenson, J. Thompson, and M. Uriarte.

Netherlands Organisation for Scientific Research (NWO). “Quantifying the importance of niches to tree species coexistence in a tropical forest” 2011-2015. 203,500 Euro. Promotor, together with promoter H. de Kroon, and co-promotor E. Jongejans.

Smithsonian Endowment. “Quantifying the importance of seedling establishment niches to plant species coexistence in a tropical forest.” 2011-2012. \$23,620. PI, with co-PIs S. J. Wright, H. de Kroon, and E. Jongejans.

National Science Foundation. “Dimensions IRCN: Diversity and forest change: characterizing functional, phylogenetic and genetic contributions to diversity gradients and dynamics in tree communities.” (DEB 1046113 ) 2011-2015. \$631,640. Co-PI with PI S. Davies and co-PIs R. Condit, W. J. Kress, and N. G. Swenson.

National Science Foundation. “Temperature responses of leaf dark respiration and their implications for tropical forest carbon balance.” (DEB 1051789 ) 2011-2014. \$444,698. Co-PI, with PI K. Kitajima and co-PIs J. Lichstein, S. J. Wright, S. Bohlman, S. Gerber.

Scholarly Studies program, Smithsonian Institution. “Monitoring tropical forest change under a shifting climate: recensusing a network of tree inventory plots in Panama.” 2010. \$53,000. Co-PI with PI R. Condit.

McKnight Land-Grant Professorship at the University of Minnesota. “Mechanisms underlying tropical forest diversity.” \$60,000 and a paid full-year sabbatical (declined). 2007.

Packard Fellowship in Science and Engineering, awarded by the David and Lucile Packard Foundation. 2006. “Uniting ecological theory and empirical studies to investigate the maintenance of tropical diversity.” \$625,000. Sole PI.

National Science Foundation. 2006-2012. “LTER: Biodiversity, environmental change and ecosystem function at the prairie-forest border.” (DEB0620652) \$4,920,000. Senior investigator, collaborating with PIs D. Tilman, S. Hobbie, P. Reich, S. Polasky, and six other senior investigators.

National Science Foundation. 2006-2011. “Collaborative Research: LTREB - Long-term studies of flowering, fruiting and seedling recruitment in Neotropical forests: global change, climate variability and mechanisms of species coexistence.” (NSF DEB 614055, 614525, and 614659; \$450,000 total) Collaborating with N. Garwood of Southern Illinois University, S. J. Wright of the Smithsonian Tropical Research Institute, and J. Zimmerman and J. Thompson of the University of Puerto Rico.

National Science Foundation. 2005-2008. “Collaborative Research: Seed dispersal by wind and plant recruitment in tropical forests – an interdisciplinary investigation across multiple scales.” (NSF DEB 0453445, 0453665, 0453296 and REU supplement 0536893; \$449,741 total) Collaborating with R. Nathan and S. J. Wright of the Smithsonian Tropical Research Institute, and R. Avissar of Duke University.

Center for Tropical Forest Science Research Grant. 2003-2004. “Seed Rain in Tropical Forests: Patterns, Causes, and Consequences for Forest Dynamics.” \$8,000.

National Center for Ecological Analysis and Synthesis Postdoctoral Fellowship. 2002-2003.

Organization for Tropical Studies Advanced Comparative Neotropical Ecology award. 2001.

Princeton Environmental Institute Research Initiative in Science and Engineering Graduate Fellowship. 1998.

Smithsonian Institution Pre-Doctoral Fellowship. 1997.

Smithsonian Tropical Research Institute Short-Term Fellowship. 1997.

National Science Foundation Graduate Fellowship. 1995.

Brinkman Prize for the best undergraduate paper in mathematics at Swarthmore College. 1995.

## **PEER-REVIEWED PUBLICATIONS (99 TOTAL)**

Visser, M. D., S. A. Schnitzer, **H. C. Muller-Landau**, E. Jongejans, H. de Kroon, L. S. Comita, S. P. Hubbell, and S. J. Wright. 2017. Tree species vary widely in their tolerance for liana infestation: a case study of differential host response to generalist parasites. *Journal of Ecology*. Accepted.

**Muller-Landau, H. C.** and S. W. Pacala. In press. What determines the abundance of lianas? In *Unsolved Problems in Ecology*, edited by A. Dobson, R. Holt, and D. Tilman.

Clark, A. T., M. Detto, **H. C. Muller-Landau**, S. A. Schnitzer, S. J. Wright, R. Condit, and S. P. Hubbell. 2017. Functional traits of tropical trees and lianas explain spatial structure across multiple scales. *Journal of Ecology*. DOI: 10.1111/1365-2745.12804

Meakem, V., A. J. Tepley, E. B. Gonzalez-Akre, V. Herrmann, **H. C. Muller-Landau**, S. J. Wright, S. P. Hubbell, R. Condit, and K. J. Anderson-Teixeira. 2017. Role of tree size in Panamanian tropical forest carbon cycling and water deficit responses. *New Phytologist*. DOI: 10.1111/nph.14633

Alfaro-Sanchez, R., **H. C. Muller-Landau**, S. J. Wright, and J. J. Camarero. 2017. Growth and reproduction respond differently to climate in three Neotropical tree species. *Oecologia*. DOI: 10.1007/s00442-017-3879-3

Bruijning, M., M. D. Visser, **H. C. Muller-Landau**, S. J. Wright, L. S. Comita, S. P. Hubbell, H. de Kroon, and E. Jongejans. 2017. Surviving in a cosexual world: a cost-benefit analysis of dioecy in tropical trees. *American Naturalist* 189:297-314. DOI: 10.1086/690137

Marks, C. O., **H. C. Muller-Landau**, and D. Tilman. 2017. Tree diversity in relation to maximum tree height: evidence for the harshness hypothesis of species diversity gradients. *Ecology Letters* 20: 398–399. DOI: 10.1111/ele.12737

Duque, A., **H. C. Muller-Landau**, R. Valencia, D. Cardenas, S. Davies, A. de Oliveira, A. J. Pérez, H. Romero-Saltos, and A. Vicentini. 2017. Insights into regional patterns of Amazonian forest structure, diversity, and dominance from three large terra-firme forest dynamics plots. *Biodiversity and Conservation* 26:669-686. DOI:10.1007/s10531-016-1265-9

- Peguero, G., **H. C. Muller-Landau**, P. A. Jansen, and S. J. Wright. 2017. Cascading effects of defaunation on the coexistence of two specialized insect seed predators. *Journal of Animal Ecology* 86:136-146. DOI: 10.1111/1365-2656.12590
- Detto, M., and **H. C. Muller-Landau**. 2016. Stabilization of species coexistence in spatial models through the aggregation-segregation effect generated by local dispersal and nonspecific local interactions. *Theoretical Population Biology* 112:97-108. DOI:10.1016/j.tpb.2016.08.008
- Chiang, J.-M., M. J. Spasojevic, **H. C. Muller-Landau**, I-F., Sun, Y. Lin, S.-H. Su, Z.-S. Chen, C.-T. Chen, N. G. Swenson, and R. W. McEwan. 2016. Functional composition drives ecosystem function through multiple mechanisms in a broadleaved subtropical forest. *Oecologia* 182:829-840. DOI:10.1007/s00442-016-3717-z
- Marks, C. O., **H. C. Muller-Landau**, and D. Tilman. 2016. Tree diversity, tree height and environmental harshness in eastern and western North America. *Ecology Letters* 19:743-751. DOI: 10.1111/ele.12608
- Lima, R. A. F., **H. C. Muller-Landau**, P. I. Prado, and R. Condit. 2016. How do size distributions relate to concurrently measured demographic rates? Evidence from over 150 tree species in Panama. *Journal of Tropical Ecology* 32:179-192. DOI:10.1017/S0266467416000146
- Detto, M. and **H. C. Muller-Landau**. 2016. Rates of formation and dissipation of clumping reveal lagged responses in tropical tree populations. *Ecology* 97:1170-1181. DOI: 10.1890/15-1505.1
- Chen, Yuxin, S. J. Wright, **H. C. Muller-Landau**, S. P. Hubbell, Y. Wang, and S. Yu. 2016. Positive effects of neighborhood complementarity on tree growth in a Neotropical forest. *Ecology* 97:776-785. DOI: 10.1890/15-0625.1
- Augspurger, C. K., S. E. Franson, K. C. Cushman, and **H. C. Muller-Landau**. 2016. Intraspecific variation in seed dispersal of a Neotropical tree and its relationship to fruit and tree traits. *Ecology and Evolution* 6:1128-42. DOI: 10.1002/ece3.1905
- Visser, M. D., M. Bruijning, S. J. Wright, **H. C. Muller-Landau**, E. Jongejans, L. S. Comita, and H. de Kroon. 2016. Functional traits as predictors of vital rates across the life-cycle of tropical trees. *Functional Ecology* 30:168-180. DOI: 10.1111/1365-2435.12621
- Anderson-Teixeira, K., J. C. McGarvey, **H. C. Muller-Landau**, J. Y. Park, E. Gonzalez-Akre, V. Herrmann, A. C. Bennett, C. V. So, N. A. Bourg, J. R. Thompson, S. M. McMahon, and W. J. McShea. 2015. Size-related scaling of tree form and function in a mixed-age forest. *Functional Ecology* 29:1587-1602. DOI:10.1111/1365-2435.12470
- Detto, M., G. P. Asner, **H. C. Muller-Landau**, and O. Sonnentag. 2015. Spatial variability in tropical forest leaf area density from multireturn LiDAR and modeling. *Journal of Geophysical Research* 120. DOI:10.1002/2014JG002774.
- Cushman, K. C., **H. C. Muller-Landau**, R. Condit, and S. P. Hubbell. 2014. Improving estimates of biomass change in buttressed trees using tree taper models. *Methods in Ecology and Evolution* 5(6):573-582. DOI: 10.1111/2041-210X.12187
- Muller-Landau, H. C.**, M. Detto, R. A. Chisholm, S. P. Hubbell, and R. Condit. 2014. Detecting and projecting changes in forest biomass from plot data. Pages 359-380 in *Forests and Global Change*. D. Coomes and D. Burslem, editors. Cambridge University Press.
- Chave, J., M. Réjou-Méchain, A. Burquez, E. Chidumayo, M. S. Colgan, W. B. C. Delitti, A. Duque, T. Eid, P. M. Feranside, R. C. Goodman, M. Henry, A. Martinez-Yrizar, W. A. Mugasha, **H. C. Muller-Landau**, M. Mecuccini, B. W. Nelson, A. Ngomanda, E. M.

- Nogueira, E. Ortiz-Malavassi, R. Péliissier, P. Ploton, C. M. Ryan, J. G. Saldarriaga, G. Vieilledent. 2014. Improved allometric models to estimate the aboveground biomass of tropical trees. *Global Change Biology* 20(10):3177-3190. DOI: 10.1111/gcb.12629
- Réjou-Méchain, M., **H. C. Muller-Landau**, M. Detto, S. C. Thomas, T. Le Toan, S. S. Saatchi, J. S. Barreto-Silva, N. A. Bourg, S. Bunyavejchewin, N. Butt, W. Y. Brockelman, M. Cao, D. Cárdenas, J.-M. Chiang, G. B. Chuyong, K. Clay, R. Condit, H. S. Dattaaja, S. J. Davies, A. Duque, S. Esufali, C. Ewango, R. H. S. Fernando, C. D. Fletcher, I. A. U. N. Gunatilleke, Z. Hao, K. E. Harms, T. B. Hart, B. Hérault, R. W. Howe, S. P. Hubbell, D. J. Johnson, D. Kenfack, A. J. Larson, L. Lin, Y. Lin, J. A. Lutz, J.-R. Makana, Y. Malhi, T. R. Marthews, R. W. McEwan, S. M. McMahon, W. J. McShea, R. Muscarella, A. Nathalang, N. S. M. Noor, C. J. Nytch, A. A. Oliveira, R. P. Phillips, N. Pongpattananurak, R. PUNCHI-Manager, R. Salim, J. Schurman, R. Sukumar, H. S. Suresh, U. Suwanvecho, D. W. Thomas, J. Thompson, M. Uriarte, R. Valencia, A. Vicentini, A. T. Wolf, S. Yap, Z. Yuan, C. E. Zartman, J. K. Zimmerman, and J. Chave. 2014. Local spatial structure of forest biomass and its consequences for remote sensing of carbon stocks. *Biogeosciences* 11: 6827-6840. DOI:10.5194/bg-11-6827-2014, 2014.
- Anderson-Teixeira K. J., S. Davies, A. Bennett, E. Gonzalez-Akre, **H. C. Muller-Landau**, S. Wright, K. Abu Salim, A. Almeyda Zambrano, A. Alonso, J. Baltzer, Y. Basset, N. Bourg, E. Broadbent, W. Brockelman, S. Bunyavejchewin, D. Burslem, N. Butt, M. Cao, D. Cardenas, G. Chuyong, K. Clay, S. Cordell, H. Dattaraja, X. Deng, M. Detto, X. Du, A. Duque, D. Erikson, C. Ewango, G. Fischer, C. Fletcher, R. Foster, C. Giardina, G. Gilbert, N. Gunatilleke, S. Gunatilleke, Z. Hao, W. Hargrove, T. Hart, B. Hau, F. He, F. Hoffman, R. Howe, S. Hubbell, F. Inman-Narahari, P. Jansen, M. Jiang, D. Johnson, M. Kanzaki, A. Kassim, D. Kenfack, S. Kibet, M. Kinnaird, L. Korte, K. Kral, J. Kumar, A. Larson, Y. Li, X. Li, S. Liu, S. Lum, J. Lutz, K. Ma, D. Maddalena, J. Makana, Y. Malhi, T. Marthews, R. Mat Serudin, S. McMahon, W. McShea, H. Memiaghe, X. Mi, T. Mizuno, M. Morecroft, J. Myers, V. Novotny, A. d. Oliveira, P. Ong, D. Orwig, R. Ostertag, J. D. Ouden, G. Parker, R. Phillips, L. Sack, M. Sainge, W. Sang, K. Sri-ngernyuang, R. Sukumar, I. Sun, W. Sungpalee, H. Suresh, S. Tan, S. Thomas, D. Thomas, J. Thompson, B. Turner, M. Uriarte, R. Valencia, M. Vallejo, V. Vicentini, T. Vrška, X. Wang, X. Wang, G. Weiblen, A. Wolf, H. Xu, S. Yap, and J. Zimmerman. 2014. CTFS-ForestGEO: a worldwide network monitoring forests in an era of global change. *Global Change Biology*. DOI: 10.1111/gcb.12712
- Jansen, P. A., M. D. Visser, S. J. Wright, G. Rutten, and **H. C. Muller-Landau**. 2014. Negative density-dependence of seed dispersal and seedling recruitment in a Neotropical palm. *Ecology Letters* 17:1111-1120. DOI: 10.1111/ele.12317
- Robeldo-Arnuncio, J. J., E. K. Klein, **H. C. Muller-Landau**, and L. Santamaria. 2014. Space, time and complexity in plant dispersal ecology. *Movement Ecology* 2:16. DOI:10.1186/s40462-014-0016-3
- Detto, M., **H. C. Muller-Landau**, J. Mascaro, and G. P. Asner. 2013. Hydrological networks and associated topographic variation as templates for the spatial organization of tropical forest vegetation. *PLOS ONE* 8(10):e76296.
- Chisholm, R. A., **H. C. Muller-Landau**, K. A. Rahman, D. P. Bebbler, Y. Bin, S. A. Bohlman, N. A. Bourg, J. Brinks, S. Bunyavejchewin, N. Butt, H. Cao, M. Cao, D. Cárdenas, L.-W. Chang, J.-M. Chiang, G. Chuyong, R. Condit, H. S. Dattaraja, S. Davies, A. Duque, C. Fletcher, C. V. S. Gunatilleke, I. A. U. N. Gunatilleke, Z. Hao, R. D. Harrison, R. Howe, C.-

- F. Hsieh, S. P. Hubbell, A. Itoh, D. Kenfack, S. Kiratiprayoon, A. J. Larson, J. Lian, D. Lin, H. Liu, J. A. Lutz, K. Ma, Y. Malhi, S. McMahon, W. McShea, M. Meegaskumbura, S. M. Razman, M. D. Morecroft, C. J. Nyctch, A. Oliveira, G. G. Parker, S. Pulla, R. PUNCHI-Manage, H. Romero-Saltos, W. Sang, J. Schurman, S.-H. Su, R. Sukumar, I-F. Sun, H. S. Suresh, S. Tan, D. Thomas, S. Thomas, J. Thompson, R. Valencia, A. Wolf, S. Yap, W. Ye, Z. Yuan and J. K. Zimmerman. 2013. Scale-dependent relationships between tree species richness and ecosystem function in forests. *Journal of Ecology* 101(5):1214-1224.
- Asner, G. P., J. Mascaró, C. Anderson, D. E. Knapp, R. E. Martin, T. Kennedy-Bowdoin, M. van Breugel, S. Davies, J. S. Hall, **H. C. Muller-Landau**, C. Potvin, W. Sousa, J. Wright and E. Bermingham. 2013. High-fidelity national carbon mapping for resource management and REDD+. *Carbon Balance and Management* 8:7.
- Puerta-Piñero C., **H. C. Muller-Landau**, O. Calderón, and S. J. Wright. 2013. Seed arrival in tropical forest tree fall gaps. *Ecology* 94:1552-1562.
- Larjavaara, M. and **H. C. Muller-Landau**. 2013. Measuring tree height: a quantitative comparison of two common field methods in a moist tropical forest. *Methods in Ecology and Evolution* 4:793-801. DOI: 10.1111/2041-210X.12071
- Detto, M., and **H. C. Muller-Landau**. 2013. Fitting ecological process models to spatial patterns using scale-wise variances and moment equations. *American Naturalist* 181:E68-E82.
- Ngo, K. M., B. L. Turner, **H. C. Muller-Landau**, S. J. Davies, M. Larjavaara, N. F. b. N. Hassan, and S. Lum. 2013. Carbon stocks in primary and secondary tropical forests in Singapore. *Forest Ecology and Management* 296:81-89.
- Bin, Y., W. Ye, **H. C. Muller-Landau**, L. Wu, J. Lian, and H. Cao. 2012. Unimodal tree size distributions possibly result from relatively strong conservatism in intermediate size classes. *PLOS ONE* 7:e52596.
- Lin, D., J. Lai, **H. C. Muller-Landau**, X. Mi, and K. Ma. 2012. Topographic variation in aboveground biomass in a subtropical evergreen broad-leaved forest in China. *PLOS ONE* 7:e48244.
- Schnitzer, S. A., S. A. Mangan, J. W. Dalling, C. A. Baldeck, S. P. Hubbell, A. Ledo, **H. Muller-Landau**, M. F. Tobin, S. Aguilar, D. Brassfield, A. Hernandez, S. Lao, R. Perez, O. Valdes, and S. Rutishauer Yorke. 2012. Liana abundance, diversity, and distribution on Barro Colorado Island, Panama. *PLOS ONE*, 7(12): e52114.
- van Putten, B., M. D. Visser, **H. C. Muller-Landau**, and P. A. Jansen. 2012. Distorted-distance models for directional dispersal: a general framework with application to a wind-dispersed tree. *Methods in Ecology and Evolution* 3:642-652.
- Larjavaara, M. and **H. C. Muller-Landau**. 2012. Temperature explains global variation in biomass among humid old-growth forests. *Global Ecology and Biogeography* 21:998-1006.
- Beckman, N. G., C. Neuhauser, and **H. C. Muller-Landau**. 2012. The interacting effects of clumped seed dispersal and distance- and density-dependent mortality on seedling recruitment patterns. *Journal of Ecology* 100:862-873.
- Asner, G. P., J. Mascaró, **H. C. Muller-Landau**, G. Vieilledent, R. Vaudry, M. Rasamoelina, J. S. Hall, and M. van Breugel. 2012. A universal airborne LiDAR approach for tropical forest carbon mapping. *Oecologia* 168: 1147-1160.
- Larjavaara, M. and **H. C. Muller-Landau**. 2012. Still rethinking the value of high wood density. *American Journal of Botany* 99:165-168.

- Muller-Landau, H. C.** 2012. Plant dispersal. *Encyclopedia of Theoretical Ecology* (edited by A. Hastings and L. Gross) pp. 198-202.
- Beckman, N. G. and **H. C. Muller-Landau.** 2011. Linking fruit traits to variation in vertebrate seed predation, insect seed predation, and pathogen attack during the predispersal stage among seven Neotropical tree and vine species. *Ecology* 92:2131-2140.
- Mascaro, J., M. Detto, G. P. Asner, and **H. C. Muller-Landau.** 2011. Evaluating uncertainty in mapping carbon with airborne LiDAR. *Remote Sensing of Environment* 115:3770-3774.
- Visser, M. D., **H. C. Muller-Landau,** S. J. Wright, G. Rutten, and P. A. Jansen. 2011. Tri-trophic interactions affect density dependence of seed fate in a tropical forest palm. *Ecology Letters* 14:1093-1100.
- Jones, F. A., D. L. Erickson, M. A. Bernal, E. Bermingham, W. J. Kress, E. A. Herre, **H. C. Muller-Landau,** B. L. Turner. 2011. The roots of diversity: below ground species richness and rooting distributions in a tropical forest revealed by DNA barcodes and inverse modeling. *PLoS One* 6:e24506.
- Mascaro, J., G. P. Asner, **H. C. Muller-Landau,** M. van Breugel, J. Hall, and K. Dahlin. 2011. Controls over aboveground forest carbon density on Barro Colorado Island, Panama. *Biogeosciences* 8:1615-1629.
- Larjavaara, M., and **H. C. Muller-Landau.** 2011. Cross-section mass: An improved basis for woody debris necromass inventory. *Silva Fennica* 45:291-298.
- Chisholm, R. A. and **H. C. Muller-Landau.** 2011. A theoretical model linking interspecific variation in density dependence to species abundances. *Theoretical Ecology* 4:241-253.
- Comita, L. S., **H. C. Muller-Landau,** Salomón Aguilar, and Stephen P. Hubbell. 2010. Asymmetric density dependence shapes species abundances in a tropical tree community. *Science* 329:330-332.
- Muller-Landau, H. C.** 2010. The tolerance-fecundity tradeoff and the maintenance of diversity in seed size. *Proceedings of the National Academy of Sciences* 107:4242-4247.
- Larjavaara, M. and **H. C. Muller-Landau.** 2010. Rethinking the value of high wood density. *Functional Ecology* 24:701-705.
- Jansen, P. A., **H. C. Muller-Landau,** and S. J. Wright. 2010. Bushmeat hunting and climate: an indirect link. *Science* 327:30.
- Dewalt, S. J., S. A. Schnitzer, J. Chave, F. Bongers, R. J. Burnham, Z. Cai, G. Chuyong, D. B. Clark, C. E. N. Ewango, J. J. Gerwing, E. Gortaire, T. Hart, G. Ibarra-Manríquez, K. Ickes, D. Kenfack, M. J. Macía, J.-R. Makana, M. Martínez-Ramos, J. Mascaro, S. Moses, **H. C. Muller-Landau,** M. P. E. Parren, N. Parthasarathy, D. R. Pérez-Salicrup, F. E. Putz, H. Romero-Saltos, and D. Thomas. 2010. Annual rainfall and seasonality predict pan-tropical patterns of liana density and basal area. *Biotropica* 42:309-317.
- Larjavaara, M. and **H. C. Muller-Landau.** 2010. Comparison of decay classification, knife test and two penetrometers for estimating wood density of coarse woody debris. *Canadian Journal of Forest Research* 40: 2313-232.
- Valencia, R., R. Condit, **H. C. Muller-Landau,** C. Hernandez, and H. Navarrete. 2009. Dissecting biomass dynamics in a large Amazonian forest plot and hypotheses about causes. *Journal of Tropical Ecology* 25:473-482.
- Wright, S. J., **H. C. Muller-Landau,** and J. Schipper. 2009. The future of tropical species on a warmer planet. *Conservation Biology* 23(6):1418-1426.
- Wright, S. J., **H. C. Muller-Landau,** A. Sanchez-Azofeifa, C. Portillo-Quintero, and D. Davies. 2009. The future of Southeast Asian forests and their species. Pages 91-104 in *Prepare for*

*Impact! When people and the environment collide in the Tropics. Papers from the May 2005 Charles Darwin Symposium, Charles Darwin University.* N. Stacey, B. Campbell, G. Boggs, B. Campbell, and W. Steffen, editors. CDU Press, Darwin.

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## OTHER PUBLICATIONS

- Muller-Landau, H. C.** 2014. Plant diversity rooted in pathogens. *Nature* 506:44-45.
- Réjou-Méchain, M., **Muller-Landau, H. C.**, Detto, M., Thomas, S. C., Le Toan, T., Saatchi, S. S., Barreto-Silva, J. S., Bourg, N. A., Bunyavejchewin, S., Butt, N., Brockelman, W. Y., Cao, M., Cárdenas, D., Chiang, J.-M., Chuyong, G. B., Clay, K., Condit, R., Dattaraja, H. S., Davies, S. J., Duque, A., Esufali, S., Ewango, C., Fernando, R. H. S., Fletcher, C. D., Gunatilleke, I. A. U. N., Hao, Z., Harms, K. E., Hart, T. B., Hérault, B., Howe, R. W., Hubbell, S. P., Johnson, D. J., Kenfack, D., Larson, A. J., Lin, L., Lin, Y., Lutz, J. A., Makana, J.-R., Malhi, Y., Marthews, T. R., McEwan, R. W., McMahan, S. M., McShea, W. J., Muscarella, R., Nathalang, A., Noor, N. S. M., Nytch, C. J., Oliveira, A. A., Phillips, R. P., Pongpattananurak, N., Punchi-Manage, R., Salim, R., Schurman, J., Sukumar, R., Suresh, H. S., Suwanvecho, U., Thomas, D. W., Thompson, J., Uriarte, M., Valencia, R., Vicentini, A., Wolf, A. T., Yap, S., Yuan, Z., Zartman, C. E., Zimmerman, J. K., and Chave, J. 2014. Local spatial structure of forest biomass and its consequences for remote sensing of carbon stocks. *Biogeosciences Discussion* 11: 5711-5742. DOI:10.5194/bgd-11-5711-2014.
- Larjavaara, M. and **H. C. Muller-Landau**. 2011. Intra-annual temperature variation and forest biomass. *Proceedings of the Pasoh International Symposium, 10-11 November 2010, Forest Research Institute Malaysia (FRIM), Selangor.*
- Mascaro, J., G. P. Asner, **H. C. Muller-Landau**, M. van Breugel, J. Hall, and K. Dahlin. 2010. Controls over aboveground forest carbon density on Barro Colorado Island, Panama. *Biogeosciences Discussion* 7:8817-8852.
- Muller-Landau, H. C.** 2009. Sink in the African jungle. *Nature* 457:969-970.
- Muller-Landau, H. C.** 2004. Book review: *Integrating Ecology and Evolution in a Spatial Context* (edited by Jonathan Silvertown and Janis Antonovics, 2001, 438 pp.). *Quarterly Review of Biology* 79(3):331.
- S. Joseph Wright and **H. C. Muller-Landau**. 2004. The future of tropical forests. *Tropinet* 15(4):1-2.
- Muller-Landau, H. C.** 2003. Seeds of understanding of plant diversity. *Proceedings of the National Academy of Sciences, USA* 100(4):1469-1471.
- Muller-Landau, H. C.**, Yu Yun Chen, I Fang Sun, S. J. Wright, S. P. Hubbell, N. Supardi Noor. 2003. Seed dispersal in a lowland dipterocarp forest during two masting events. *Proceedings of the Seminar on Ecological Research in Tropical Forests, (CFFPR series 2003), 19-21 August 2003, FRIM Kuala Lumpur, Malaysia*
- Muller-Landau, H. C.** 2001. Seed dispersal in a tropical forest – empirical patterns, their origins and their consequences for forest dynamics. PhD Dissertation. Princeton University.

**Muller-Landau, H. C.** 1998. Book review: *Tropical Forest Remnants: Ecology, Management, and Conservation of Fragmented Communities* (edited by Laurance, William F., and Richard O. Bierregaard, Jr., 1997, 616 pp.). *Ecoscience* 5(2):281-282.

## **INVITED SEMINARS**

Radboud University Nijmegen. November 15, 2016.  
University of Florida. October 14, 2016.  
Princeton University. April 21, 2016.  
University of Miami, Gifford Arboretum speaker. April 7, 2016.  
Fairchild Botanical Garden. February 22, 2015. Keynote speaker, Tropical Biology Symposium.  
Oxford University. June 21, 2014.  
Oak Ridge National Labs. January 31, 2013.  
National Institute for Mathematical and Biological Synthesis. January 29, 2013.  
University of Florida. December 11, 2012.  
University of Arizona. November 26, 2012.  
Princeton University. December 1, 2011.  
University of Utah. September 22, 2010.  
Laboratoire Evolution et Diversité Biologique, Centre National de la Recherche Scientifique, Toulouse, France. June 9, 2010.  
Utrecht University, Utrecht, the Netherlands. May 25, 2010.  
Wageningen University and Research Centre, Wageningen, the Netherlands. May 20, 2010.  
Nijmegen University, Nijmegen, the Netherlands. May 19, 2010.  
Gröningen University, Gröningen, the Netherlands. May 17, 2010.  
University of Toronto, Toronto, Canada. April 10, 2010.  
Forest Research Institute of Malaysia, Kuala Lumpur, Malaysia. May 26, 2008.  
Kunming Institute of Botany, Chinese Academy of Sciences, Kunming., China April 29, 2008.  
Institute of Botany, Chinese Academy of Sciences, Beijing, China. April 18,19, 2008.  
Fushan Research Station, Fushan, Taiwan. April 12,13, 2008.  
University of Georgia, Athens, Institute of Ecology. January 26, 2006.  
Carleton College, Minnesota. October 31, 2005.  
Kellogg Biological Station, Michigan State University. October 21, 2005.  
University of Puerto Rico, Rio Piedras. June 1, 2005.  
Ohio University. April 21, 2005.  
University of Michigan, Ann Arbor. March 25, 2003.  
University of Colorado, Boulder. March 6, 2003.  
University of Minnesota. February 19, 2003.  
University of Tennessee, Knoxville. January 27, 2003.  
University of Ulm, Germany. December 18, 2001.

## INVITED CONFERENCE PRESENTATIONS

- Muller-Landau, H. C.** What determines the abundance and impact of lianas? Invited keynote. European Conference of Tropical Ecology and the Annual meeting of the Society for Tropical Ecology. Brussels, Belgium. February 10, 2017.
- Muller-Landau, H. C.** What determines the abundance and ecosystem impact of lianas and vines? Invited keynote. NGEE-Tropics annual meeting. Washington, DC. September 21, 2016.
- Muller-Landau, H. C.** Tree and forest allometries: Critical links between field and remote sensing data. Smithsonian-NASA workshop on Calibration and Validation of Upcoming NASA and ESA Satellite Missions on Forest Structure and Biomass. Washington, DC. June 2, 2016.
- Muller-Landau, H. C.,** S. J. Wright, M. Detto, E. Lebrija-Trejos, R. Alfaro Sánchez, K. C. Cushman, C. Tribble, O. Calderón, P. Ramos, and P. Villareal. Interspecific variation in responses of tropical trees to interannual climate variation. Organized oral session on Functional, Phylogenetic and Genetic Dimensions of Forest Diversity and Change. Ecological Society of America annual meeting in Baltimore, Maryland. August, 2015.
- Muller-Landau, H. C.** Tropical forest carbon stocks and fluxes. Threats to tropical rainforests in an era of rapid environmental change – a global synthesis. London, UK. October 6, 2014.
- Muller-Landau, H. C.** Conceptual frameworks for understanding anthropogenic disruption of ecological communities. Tansley meeting: Bridging the gap between community ecology and conservation. Silwood Park, Imperial College of London. June 23, 2014.
- Muller-Landau, H. C.** A theoretical framework for effects of defaunation on plant communities. Workshop on Trophic downgrading and its biodiversity consequences in Neotropical versus Afrotropical rainforests. La Selva Biological Station, Costa Rica. June 30, 2013.
- Muller-Landau, H. C.,** M. Detto, and F. Adler. How seed dispersal distances and natural enemy interaction scales influence population spatial structure, population regulation, and diversity maintenance. Association for Tropical Biology and Conservation annual meeting. San Jose, Costa Rica. June 26, 2013.
- Muller-Landau, H. C.** and M. Detto. Investigating seed dispersal and natural enemy attack with wavelet variances and moment methods. Everything Disperses to Miami: The role of Movement and Dispersal in Ecology, Epidemiology and Environmental Sciences. Miami, FL. December 14, 2012.
- Muller-Landau, H. C.,** M. Visser, M. Detto, E. Jongejans, R. Chisholm, H. de Kroon, and S. J. Wright. Quantifying contributions to diversity maintenance: using population biology to address community-level questions. European Population Biology annual meeting. Zurich, Switzerland. May 19, 2012.
- Muller-Landau, H. C.,** M. Detto, and R. Chisholm. Random and systematic errors in estimates of aboveground biomass stocks and fluxes in tropical forests. Silvacarbon Uncertainty workshop. Washington, DC. October 26, 2011.
- Muller-Landau, H. C.,** M. Detto, and S. J. Wright. Interannual variation in leaf, fruit and flower production in Panamanian tropical forests and the implications for understanding global change. Launching Meeting and Open Symposium of NSF-NSFC Joint Project (Dimensions IRCN: Diversity and Forest Change: Characterizing functional, phylogenetic and genetic contributions to diversity gradients and dynamics in tree communities). Beijing, China. July 28, 2011.

- Muller-Landau, H. C.** Tropical forest dynamics and carbon budgets in a changing world. Environmental Leadership and Training Initiative conference on REDD+: Technical, Socioeconomic and Political Dimensions. Panama City, Panama. April 7, 2011.
- Muller-Landau, H. C.**, S. J. Wright, M. Detto, R. A. Chisholm, R. Condit, and S. P. Hubbell. Interannual variation in carbon stocks and fluxes in Panamanian tropical forests and their implications for understanding global change. British Ecological Society symposium on Forests and Global Change. Cambridge, England. March 30, 2011.
- Muller-Landau, H. C.**, M. Visser, E. Jongejans, H. de Kroon, S. J. Wright, P. Zuidema, S. Tuljapurkar. Quantifying the importance of niches to tree species coexistence using tree plot data and a life cycle approach. Symposium on Forest Dynamics Research at SIGeo-CTFS. Panama City, Panama. February 22, 2011.
- Muller-Landau, H. C.**, S. J. Wright, O. Calderon, A. Hernandez. The tolerance-fecundity tradeoff and the maintenance of seed size diversity: theory and tests in a tropical forest. Frugivores and Seed Dispersal: Mechanisms and Consequences of a Key Interaction for Biodiversity. Montpellier, France. June 15, 2010.
- Muller-Landau, H. C.** The tolerance-fecundity tradeoff and the maintenance of diversity in seed size. Plant Population Biology: Crossing Borders. Nijmegen, the Netherlands. May 14, 2010.
- Muller-Landau, H. C.** The tolerance-fecundity tradeoff and the maintenance of seed size diversity in variable and changing environments. 6th Annual Harvard Plant Biology Symposium: Trees and the Global Environment. Harvard University, Cambridge, MA, USA. April 30, 2010.
- Muller-Landau, H. C.**, R. Valencia, M. Firdaus, S. Kiratiprayoon, R. Sukumar, S. Tan, S. Noor, S. Bunyavejchewin, S. Hubbell, and M. Larjavaara. Forest plots, climate change, and the global carbon cycle: Linking forest carbon dynamics to their drivers via forest structure and composition. Taking Stock: HSBC Climate Partnership Research Meeting. Smithsonian Tropical Research Institute, Panama. March 1, 2010.
- Muller-Landau, H. C.**, S. Bunyavejchewin, M. Firdaus, S.P. Hubbell, S. Kiratiprayoon, M. Larjavaara, S. Schnitzer, Nur Supardi M. N., S. Tan, R. Valencia. Large forest plots, climate change, and the global carbon cycle: Linking forest carbon dynamics to their drivers via forest structure and composition. Organized Oral Session on Ecological Insights from Long-Term Research Plots in Tropical and Temperate Forests. Ecological Society of America Annual Meeting. Albuquerque, New Mexico, USA. August 6, 2009.
- Muller-Landau, H. C.** What can metabolic ecology contribute to plant ecology? Gordon Research Conference on the Metabolic Basis of Ecology. Biddeford, Maine. July 10, 2008.
- Muller-Landau, H. C.**, S. Joseph Wright, O. Calderón, and A. Hernández. Colonization-related tradeoffs and the maintenance of seed size diversity in tropical forests. Symposium on Regeneration ecology across the tropics: Cross-site comparisons of seed and seedling dynamics. Association for Tropical Biology and Conservation annual meeting. Paramaribo, Suriname. June 12, 2008.
- Liza Comita, Maria Uriarte, **Helene Muller-Landau**, Jill Thompson, Jess Zimmerman, and Stephen Hubbell. Seeing the forest for the species: Cross-site comparisons of tropical forest dynamics using hierarchical Bayesian models. Association for Tropical Biology and Conservation annual meeting. Symposium on Regeneration ecology across the tropics: Cross-site comparisons of seed and seedling dynamics. Paramaribo, Suriname. June 12, 2008.

- Andy Jones and **Helene Muller-Landau**. Measuring long distance seed dispersal in complex tropical forests: integrating and evaluating genetic and classical techniques. Symposium on Advances in dispersal ecology: Applying molecular approaches to understanding movement pathways at local and landscape scales. Association for Tropical Biology and Conservation annual meeting. Paramaribo, Suriname. June 9, 2008.
- Muller-Landau, H. C.** and F. R. Adler. Diversity-enhancing Janzen-Connell effects: What do our studies really tell us about their role in plant communities? Association for Tropical Biology and Conservation annual meeting. Symposium on Ecological Theory and Tropical Ecology. Morelia, Mexico. July 17, 2007.
- Comita, L. S., **H. C. Muller-Landau**, R. Condit, S. J. Wright, and S. P. Hubbell. To what degree do stabilizing (frequency-dependent) forces at different life stages contribute to tree species coexistence in tropical forests? Association for Tropical Biology and Conservation annual meeting. Symposium on Ecological Theory and Tropical Ecology. Morelia, Mexico. July 17, 2007.
- Vargas-Timchencko, M., **H. Muller-Landau**, and S. J. Wright. Are lianas better than trees at colonizing treefall gaps as seeds or seedlings? Association for Tropical Biology and Conservation annual meeting. Symposium on Ecology and Management of Climbing Plants. Morelia, Mexico. July 18, 2007.
- Wright, S. J. and **H. C. Muller-Landau**. Land use change, climate change and the extinction of tropical forest species. Association for Tropical Biology and Conservation annual meeting. Symposium on Debating the Tropical Extinction Crisis. Morelia, Mexico. July 18, 2007.
- Jansen, P. A., P. Van Eijk, S. J. Wright, and **H. Muller-Landau**. Hunting relieves recruitment limitation in a Neotropical palm. Association for Tropical Biology and Conservation annual meeting. Symposium on Seed Dispersal and Seed Predation in Neotropical Palms. Morelia, Mexico. July 19, 2007.
- Muller-Landau, H. C.** Integrating theory and data to predict long-term effects of hunting on plant species composition and diversity. Association for Tropical Biology and Conservation annual meeting. Symposium on Hunting and Implications for Plants. Überlandia, Brazil. July 28, 2005.
- Muller-Landau, H. C.** and S. Joseph Wright. Competition-colonization trade-offs and seed limitation in tropical forests. International Botanical Congress. Symposium on Integrating the Dispersal-assembly and Niche-assembly Paradigms in Plant Community Ecology. Vienna, Austria. July 19, 2005.
- Muller-Landau, H. C.** and S. Joseph Wright. Seed dispersal and species distributions in tropical forests today and in the future. International Botanical Congress. Symposium on The impact of plant dispersal on biogeography: Current understanding and prospect. Vienna, Austria. July 19, 2005.
- Muller-Landau, H. C.** and F. R. Adler. How dispersal affects interactions with natural enemies and their contribution to diversity maintenance. Plenary speaker. International Symposium/Workshop on Frugivores and Seed Dispersal. Brisbane, Australia. July 11, 2005.
- Muller-Landau, H. C.** Relating functional traits, demography, and size distributions of tropical tree species and communities. Association for Tropical Biology and Conservation annual meeting. Symposium on Morphology and Life History Relationships Among Neotropical Forest Trees. Miami, Florida. July 15, 2004.

- Muller-Landau, H. C.** Interspecific and intersite variation in wood density of tropical trees. Association for Tropical Biology annual meeting, Symposium on Four Neotropical Forests. Panama City, Panama. August 2, 2002.
- Muller-Landau, H. C.,** J. K. Zimmerman, S. J. Wright, and J. Giacalone. Intersite and interannual variation in seed production and seed dispersal. Association for Tropical Biology annual meeting, Symposium on Tropical Forest Dynamics. Panama City, Panama. August 2, 2002.
- Muller-Landau, H. C.,** S. J. Wright, S. P. Hubbell, R. Condit, R. B. Foster. What life history trade-offs do tropical trees face, and how do they contribute to tree diversity? Association for Tropical Biology annual meeting, Symposium on Tropical Tree Diversity. Panama City, Panama. July 31, 2002.
- Muller-Landau, H. C.,** S. A. Levin, J. E. Keymer, and S. W. Pacala. Theoretical explorations of the evolution of long-distance dispersal: the example of specialized pests. Ecological Society of American annual meeting. Symposium on Long-Distance Dispersal. Madison, Wisconsin. August 6, 2001.
- Muller-Landau, H. C.,** S. J. Wright, O. Calderón, A. Hernández, S. P. Hubbell, R. Condit, and R. B. Foster. Recruitment limitation in a seasonally wet tropical forest on Barro Colorado Island, Panama. Plenary speaker. Symposium-workshop on Frugivores and Seed Dispersal. Rio Quente, Brazil. August, 2000.

## CONTRIBUTED CONFERENCE PRESENTATIONS

- Muller-Landau, H. C.,** S. J. Wright, M. Detto, E. Lebrija-Trejos, R. Alfaro Sánchez, K. C. Cushman, C. Tribble, O. Calderón, P. Ramos, and P. Villareal. Interspecific variation in responses of tropical trees to interannual climate variation. Association for Tropical Biology and Conservation annual meeting in Honolulu, Hawaii. July, 2015.
- Muller-Landau, H.,** B. L. Turner, K. C. Cushman, J. Mascaro, G. P. Asner, M. Larjavaara, P. Ramos, P. Villareal, R. Condit, and S. P. Hubbell. Reservas de carbono en la isla Barro Colorado. Congreso nacional de ciencia y tecnología de la Asociación Panameña para el Avance de la Ciencia. October 16, 2014.
- Muller-Landau, H. C.,** M. Detto, and F. R. Adler. How the spatial scales of interactions with natural enemies influence both their contributions to diversity maintenance and our ability to measure these contributions – and implications for the interpretation of Janzen-Connell studies. Ecological Society of America meeting in Portland, Oregon. August 2012.
- Detto, M., and **H. C. Muller-Landau.** Investigating ecological spatial aggregation using wavelets and moment equations. Ecological Society of America meeting in Portland, Oregon. August 2012.
- Chisholm, R. A., **H. C. Muller-Landau,** and 65 coauthors. Relationships between species richness and ecosystem function across a global network of forest plots. Ecological Society of America meeting in Portland, Oregon. August 2012.
- Yue Bin, Wanhui Ye, **H. C. Muller-Landau,** Linfang Wu, Honglin Cao, and Juyu Lian. Tree size distribution, population trend and shade tolerance. Ecological Society of America meeting in Portland, Oregon. August 2012.



- Mayor, J. R., B. L. Turner, **H. C. Muller-Landau**, E. A. G. Schuur, and S. J. Wright. Response of tropical forest nitrogen isotope ratios to 13 years of nitrogen and phosphorus fertilization. Ecological Society of America meeting in Portland, Oregon. August 2012.
- Beckman, N.G. and **H.C. Muller-Landau**. Linking interspecific variation in vertebrate seed predation, insect seed predation, and pathogen attack to fruit traits in tropical woody plants. Ecological Society of America meeting in Albuquerque, New Mexico. August 2009.
- Beckman, N.G. and **H.C. Muller-Landau**. Linking interspecific variation in vertebrate seed predation, insect seed predation, and pathogen attack to fruit traits in tropical woody plants. Association for Tropical Biology and Conservation Annual Meeting in Marburg, Germany. July 2009.
- Larjavaara, M. & **H. C. Muller-Landau**. CTFS Global Forest Carbon Research Initiative and how we quantify fallen coarse woody debris. ATBC Asia-Pacific Chapter annual meeting. Chiang Mai, Thailand, February 12-15, 2009.
- Muller-Landau, H. C.**, S. Joseph Wright, O. Calderón, and A. Hernández. Colonization-related tradeoffs and the maintenance of seed size diversity in tropical forests. Ecological Society of America Annual Meeting. Milwaukee, Wisconsin. August 5, 2008.
- Beckman, N. G. and **H.C. Muller-Landau**. Effects of vertebrate seed dispersers, insect seed predators, and pathogens in seed survival at the pre-dispersal stage of several tropical woody plants. Ecological Society of America Annual Meeting, Milwaukee, Wisconsin. August 2008.
- Muller-Landau, H. C.**, B. L. Turner, M. Larjavaara, D. King, S. X. Dong, S. Bunyavejchewin, N. Supardi, S. P. Hubbell. Smithsonian Global Forest Carbon Research Initiative: Quantifying and explaining variation in carbon pools and fluxes in tropical and temperate forests. Association for Tropical Biology and Conservation annual meeting. Paramaribo, Suriname. June 12, 2008. (poster)
- Muller-Landau, H. C.** Forest carbon budgets and global change. Center for Tropical Forest Science workshop: Investigating responses of tropical forest carbon budgets and functional composition to global change. Singapore. April 7-9, 2008.
- Muller-Landau, H. C.** A new Smithsonian initiative on carbon budgets and impacts of global change in tropical and temperate forests. International Science Symposium on Climate Change and Biodiversity. Panama City, Panama. February 26, 2008.
- Muller-Landau, H. C.** Forest carbon budgets and global change: An HSBC-funded research program at CTFS. HSBC Climate Partnership meeting. Oxford, UK. January 24, 2008.
- Muller-Landau, H. C.** Investigating carbon dynamics and global change at CTFS. Center for Tropical Forest Science Principal Investigator's Meeting. Santa Barbara, California. September 14, 2007.
- Muller-Landau, H. C.** What keeps everyone in the game? Investigating the maintenance of species diversity. Packard Fellows Meeting. Monterey, California. September 6, 2007.
- Beckman, N. G. and **H. C. Muller-Landau**. How do different empirically derived patterns of natural enemy attack and seed dispersal affect patterns of seedling recruitment? Ecological Society of America annual meeting. San Jose, California. August 8, 2007.
- Marks, C. O. , **H. C. Muller-Landau**, and G. D. Tilman. Phenotypic constraints offer a general, evolutionary explanation for species diversity gradients. Ecological Society of America annual meeting. San Jose, California. August 9, 2007.

- Beckman, N. and **H. Muller-Landau**. Implications of hunting for tropical plant community composition: Differential effects on seed removal. Association for Tropical Biology and Conservation Annual Meeting. Überlandia, Brazil. July, 2005.
- Muller-Landau, H.C.**, R.S. Condit, K.E. Harms, J.W. Ahmad, P. Ashton, S.A. Bohlman, S. Buyavejchewin, G. Chuyong, L. Co, S. Davies, S. Esufali, R. Foster, C.V.S. Gunatilleke, I.A.U.N. Gunatilleke, P. Hall, T. Hart, F. He, S. Hebbalalu, C. Hernandez, S.P. Hubbell, A. Itol, R. John, D. Kenfack, S. Kiratiprayoon, J. V. LaFrankie, D. Lagunzad, E. Losos, J-R. Makana, S. Noor, T. Ohkubo, N. Pongpattananurak, C. Samper, L.H. Seng, D. Shivaramaiah, R. Sukumar, I-F. Sun, S. Tan, S. Thomas, D. Thomas, J. Thompson, M. Uriarte, R. Valencia, M.I. Vallejo, G. Villa, C. Wills, T. Yamakura. Scaling of demographic rates and tree size distributions in tropical forests. Center for Tropical Forest Science annual meeting. Panama City, Panama. June 5, 2005.
- Gilbert, B.G., S.J. Wright, K. Kitajima, **H. C. Muller-Landau**, A. Hernandez. Life history trade-offs in tropical trees and lianas. Ecological Society of American annual meeting. Portland, Oregon. August 5, 2004.
- Muller-Landau, H. C.**, S. W. Pacala, S. P. Hubbell, R. Condit, R. B. Foster. Characterizing species regeneration strategies with respect to light availability in a wet tropical forest. Ecological Society of American annual meeting. Portland, Oregon. August 4, 2004.
- Muller-Landau, H. C.**, Yu Yun Chen, I Fang Sun, S. J. Wright, S. P. Hubbell, N. Supardi Noor. Seed dispersal in a lowland dipterocarp forest. Seminar on Ecological Research in Tropical Forests. Forest Research Institute of Malaysia, Kuala Lumpur, Malaysia. August 19, 2003.
- Muller-Landau, H. C.** and S. J. Wright. Seed mass and the tradeoff between seed arrival and seed survival in central Panama. Association for Tropical Biology and Conservation annual meeting. Aberdeen, Scotland. July 9, 2003.
- Muller-Landau, H.** and J. Zimmerman. Seed dispersal and production in Luquillo. Luquillo LTER meeting. University of Puerto Rico. San Juan, Puerto Rico. January 18, 2003.
- Muller-Landau, H. C.**, R. Condit, S. J. Wright, S. P. Hubbell, R. B. Foster. Life history diversity of tropical tree species and its consequences for forest-wide patterns of growth, mortality and size distributions. Ecological Society of America annual meeting, Tucson, Arizona. August 8, 2002.
- Adler, F. R., and **H. C. Muller-Landau**. The potential of localized natural enemies to maintain species diversity. Ecological Society of America annual meeting, Tucson, Arizona. August, 2002.
- Muller-Landau, H. C.**, S. P. Hubbell, S. W. Pacala, S. J. Wright, R. Condit, R. B. Foster. Interspecific differences in life history strategies of trees in a Panamanian forest: empirical patterns, physiological causes, and implications for forest dynamics. Center for Tropical Forest Science meeting. Singapore. June, 2000.
- Muller-Landau, H. C.**, S. J. Wright, O. Calderon, A. Hernandez. Recruitment limitation of tree species on Barro Colorado Island, Panama. Workshop on biodiversity and ecosystem function. Centre for Population Biology at Silwood Park, Imperial College of London, UK. May 25, 2000.
- Muller-Landau, H. C.**, S. J. Wright, S. P. Hubbell, R. B. Foster, R. Condit. Interspecific variation in seed shadows and fecundity of trees in a Neotropical forest. Ecological Society of American annual meeting, Spokane, WA. August, 1999.

- Muller-Landau, H. C.,** S. J. Wright, O. Calderón, R. Condit, S. P. Hubbell, R. B. Foster. Interspecific variation in seed shadows and fecundity of trees in a neotropical forest. Center for Tropical Forest Science first network meeting. Washington, DC. July 1998.
- Muller-Landau, H. C.,** B. S. Wechsler, R. Pérez, W. E. Pugh, E. A. Carlisle, S. P. Hubbell, R. Condit, and R. B. Foster. Abundance, distribution, growth and mortality patterns of seedlings and small saplings in a neotropical forest. Association for Tropical Biology annual meeting. San Jose, Costa Rica. June 1997.
- Muller-Landau, H.** and R. L. Boyce. WINWAT meets MTCLIM: coupling an input-intensive winter water relations model with an output-sparse mountain climate model. Poster. Ecological Society of America annual meeting. Snowbird, UT. August 1995.
- Muller-Landau, H. C.,** J. Weiner, and A. Jasentuliyana. Spatial pattern, competitive asymmetry and size variability in an individual-based plant population model. Southeastern Mathematical and Statistical Ecology Conference, Raleigh, NC. 1994.

## **OTHER SEMINARS**

- What determines the abundance and impact of lianas? Smithsonian Tropical Research Institute. Panama City, Panama. November 1, 2016.
- Why don't lianas take over forests everywhere? Pacala lab group meeting. Princeton University. January 11, 2016.
- Investigating tropical forest structure, dynamics, and phenology using camera-carrying unmanned aerial vehicles. Theoretical ecology lab tea. Princeton University. October 14, 2015.
- UAV forest ecology at STRI. Coomes lab group. Cambridge University. March 9, 2015.
- Patterns and causes of interspecific variation in seed arrival and seedling recruitment in a tropical tree community. Center for Tropical Forest Science talks. Smithsonian Tropical Research Institute. April 15, 2014.
- Tropical forest carbon stocks: patterns and correlates at local and landscape scales. Smithsonian Tropical Research Institute. October 22, 2013.
- Detecting and projecting forest biomass change from plot data. Smithsonian Tropical Research Institute. January 3, 2012.
- Forest carbon and climate at CTFS/SIGEO plots. CTFS-SIGEO analytical workshop. Changbai station. Changbai, China. July 23, 2011.
- Interannual variation in carbon stocks and fluxes in Panamanian tropical forests and their implications for understanding global change. CTFS-Science Talk. Smithsonian Tropical Research Institute. April 5, 2011.
- The tolerance-fecundity tradeoff and the maintenance of diversity in seed size in plant communities. Smithsonian Tropical Research Institute. May 10, 2010.
- Colonization-related tradeoffs and the maintenance of diversity in plant communities. Smithsonian Tropical Research Institute. June 30, 2009.
- Towards a better understanding of tropical forest carbon dynamics and their responses to global change. Dept of Ecology and Evolutionary Biology, Princeton University. April 1, 2008
- Towards a better understanding of tropical forest carbon dynamics and their responses to global change. Friday noon seminar series, Dept of Ecology, Evolution and Behavior, University of Minnesota. November 9, 2007.

Predicting the long-term effects of hunting on plant species composition and diversity in tropical forests. Program in Conservation Biology, University of Minnesota. November 13, 2006.

Tree allometry, growth, mortality and size distributions: Theoretical predictions and empirical patterns in 14 tropical forests. Smithsonian Tropical Research Institute. May 16, 2006.

Can the theory of metabolic ecology explain tropical forest dynamics and structure? Friday noon seminar series, Dept of Ecology, Evolution and Behavior, University of Minnesota. November 18, 2005.

Spatial dynamics of plant species and their specialized natural enemies. Friday noon seminar series, Dept of Ecology, Evolution and Behavior, University of Minnesota. April 29, 2005.

Spatial dynamics of plant species and their specialized natural enemies. Saint Anthony Falls Laboratory, University of Minnesota. April 13, 2005.

Tree size distributions in tropical forests. Princeton University, Princeton, NJ. Carbon Mitigation Initiative meeting. April 12, 2004.

Sapling growth and light availability in tropical forests: analyzing general patterns and sources of variation. Princeton University, Princeton, NJ. Theoretical ecology lab tea. March 23, 2004.

Understanding tree size distributions in tropical forests. Princeton University, Princeton, NJ. Ecology and Evolutionary Biology postdoc forum. February 19, 2004.

Scaling of demographic rates and tree size distributions in tropical forests. National Center for Ecological Analysis and Synthesis. Tropical Tree Life History Strategies working group. Santa Barbara, CA. December 7, 2003.

Comparing tropical forests: tree size distributions, seed dispersal, and related life history traits. National Center for Ecological Analysis and Synthesis. Advisory Council meeting. Santa Barbara, CA. September 11, 2003.

Understanding size distributions in tropical forests. National Center for Ecological Analysis and Synthesis. Santa Barbara, CA. May 12, 2003.

Understanding size distributions in tropical forests. Smithsonian Tropical Research Institute, Panama City, Panama. April 15, 2003.

Community ecology of trees on BCI: How can ARTS help? Workshop on plant-animal interactions. Smithsonian Tropical Research Institute, Panama. April 13, 2003.

Seed dispersal in two tropical forests: empirical patterns, their origins, and their consequences for forest dynamics. University of Utah, Salt Lake City. December 6, 2002.

Tropical tree life history strategies and community structure. Laboratoire ECOFOG, French Guiana. Ecologie Comparative en Forêt Tropicale (Comparative Ecology in Tropical Forests). October 3, 2002.

Growth, mortality and the size distributions of tropical trees. Center for Tropical Forest Science workshop. Gamboa, Panama. July 25, 2002.

Seed production and dispersal in a tropical forest: empirical patterns, their origins, and their consequences for forest dynamics. National Center for Ecological Analysis and Synthesis. Santa Barbara, CA. February 7, 2002.

Interspecific and intersite variation in tree life history strategies: empirical patterns, their origins, and their consequences for forest dynamics. Cocha Cashu Biological Station, Peru. October 19, 2001.

Seed dispersal in a tropical forest: empirical patterns, their origins, and their consequences for forest dynamics. Princeton University, Princeton, NJ. Final public oral thesis defense. September 4, 2001.

Interspecific differences in life history strategies of trees in a Panamanian forest: empirical patterns, physiological causes, and implications for forest dynamics. Cambridge University, Cambridge, UK. May 22, 2000.

Recruitment limitation of tree species on Barro Colorado Island. Princeton University, Princeton, NJ. Theoretical ecology lab tea. May 12, 2000.

Interspecific variation in strategies of trees in a Panamanian tropical forest. Princeton University, Princeton, NJ. Ecology and Evolutionary Biology annual retreat. Fall 1999.

Interspecific variation in seed dispersal in a tropical forest. Theoretical Ecology lab tea. March 1999.

Interspecific variation in seed shadows and fecundity of trees in a neotropical forest. Smithsonian Tropical Research Institute. Bambi seminar. Smithsonian Tropical Research Institute. Barro Colorado Island, Panama. February 1999.

Disentangling the effects of dispersal patterns, density-dependent mortality, and habitat preferences. Princeton University, Princeton, NJ. Ecology and Evolutionary Biology annual retreat. Fall 1998.

Interspecific differences in seed dispersal curves of trees on Barro Colorado Island. Bambi seminar. Smithsonian Tropical Research Institute. Barro Colorado Island, Panama. May 1998.

Interspecific differences in mortality of tropical tree species on Barro Colorado Island. Princeton University, Princeton, NJ. Ecology and Evolutionary Biology annual retreat. Fall 1997.

Interspecific differences in sapling growth as a function of light availability: A comparative study of tropical trees using fisheye photos. Princeton University, Princeton, NJ. Ecology and Evolutionary Biology annual retreat. Fall 1996.

## **STUDENTS AND SCHOLARS ADVISED**

### **Postdoctoral scholars advised:**

Ervan Rutishauser, June 2016 – present.

Isabel Martinez, January 2016 - present (at Princeton University).

Jonathan Dandois, August 2014 – December 2015.

Edwin Lebrija-Trejos, Jan 2014 – August 2015.

Raquel Alfaro Sanchez, January - April, 2015.

Guille Peguero, May-August, 2013.

Carolina Puerta-Piñera, January 2010 – December 2012 (co-advised with Joe Wright).

Matteo Detto, October 2010 – October 2012; October 2015 – present.

Joe Mascaro, July 2010 – September 2012. (co-advised with Greg Asner)

Ryan Chisholm, August 2010 – August 2012.

Markku Larjavaara, November 2007 – June 2011.

Omar Lopez, September 2010 – January 2011

F. Andy Jones, February – August 2008.

Liza Comita, January 2007 – January 2008.

David King, October –Dec 2007.

Christian Marks, November 2005 – September 2007.

### **Graduate students advised:**

Marco Visser. STRI predoctoral fellow as a PhD student at Radboud University Nijmegen, and previously STRI short-term fellow while a masters student at Wageningen University. PhD 2016. (co-promoter, with promoter Hans de Kroon and co-promoter Eelke Jongejans)

Marta Vargas, masters student in Ecology, Evolution and Behavior, University of Minnesota, MS 2012.

Noelle Beckman, PhD student in Ecology, Evolution and Behavior, University of Minnesota. PhD 2010. (co-advised with Claudia Neuhauser)

### **Undergraduate students and interns advised:**

Fabrizio Protti, STRI intern, May 2016 – present.

Areli Benito, STRI intern, August 2015 – June 2016.

Ryan Nolin, STRI intern, June-August 2015.

Marino Ramirez, STRI intern, October 2014 – May 2015.

Carrie Tribble, STRI intern, October 2014 – August 2015.

Emily Francis, STRI intern, January – August 2014.

KC Cushman, STRI intern, September 2012 – August 2014.

Jeff Matzke, University of Minnesota, fall 2007.

Milcah Scott, University of Minnesota, fall 2007.

Caroline Farrior, University of Pennsylvania, summer 2006.

Sonja Riddle-Ford, SEPGM program, University of Minnesota, summer 2006.

John Best, REU student from Clarkson University, spring 2006.

Josh Dumas, SEPGM program, University of Minnesota, summer 2005.

Sarah Kaplan, Princeton University, summer 1999.

### **SCIENTIFIC SERVICE**

Editorial board member: *Functional Ecology* 2016 – present. *Methods in Ecology and Evolution* 2012-2015; *Theoretical Ecology* 2007-2011; *Ecological Research* 2004-2007.

Reviewer for the journals *Science*, *Nature*, *PNAS*, *Ecology Letters*, *American Naturalist*, *Ecology*, *Journal of Ecology*, *Oecologia*, *Oikos*, *Theoretical Population Biology*, *Biotropica*, *Plant Ecology*, *Molecular Ecology*, *Methods in Ecology and Evolution*, *Nature Communications*, *PLoS One*, *Plant Biology*, *Forest Ecology and Management*, *Journal of Environmental Monitoring*, *Ecosystems*, *Theoretical Ecology*, *Acta Oecologia*, *New Phytologist*, *Ecological Research*, *PLOS Biology*, *Proceedings of the Royal Society*, *Trends in Ecology and Evolution*, *Ecological Monographs*, *Journal of Theoretical Biology*, *Bulletin of Mathematical Biology*, *Functional Ecology*, *Journal of Applied Ecology*, *Ecological Applications*, *Journal of Tropical Ecology*, *Plant Ecology*, *Journal of Vegetation Science*, *Canadian Journal of Forest Research*, *Ecoscience*, *Annales Botanici Fenici*, *Diversity and Distribution*, *Dispersal and Distributions*, as well as for Springer and Princeton University Press.

National Science Foundation review panels: Ecology, April 5-7, 2006 and Evolutionary and Population Ecology, April 15-17, 2009.

Chairperson, NEON (National Ecological Observatory Network) Plant Productivity and Biomass Technical Working Group, 2012-present.

Silvacarbon technical team member, 2012-present.

Reviewer for the National Science Foundation (NSF, USA), DOE National Institute for Climatic Change Research (NICCR, USA), MacArthur Foundation, Netherlands Organisation for Scientific Research (NWO, the Netherlands), National Environmental Research Council (NERC, UK), Deutsche Forschungsgemeinschaft (DFG, Germany), Swiss National Science Foundation (Switzerland).

Organized the symposium “Ecological theory and tropical ecology: bridging the gap for mutual gain.” Association for Tropical Biology and Conservation annual meeting. Morelia, Mexico. July 15-19, 2007. Co-organized with J. Chave.

## **OUTREACH AND PUBLIC SERVICE**

Panama REDD+ (Reduced Emissions from Deforestation and Degradation) roundtable, MRV (Monitoring Reporting Verification) subgroup, a joint initiative of ANAM (Autoridad Nacional del Ambiente) and UN-REDD. 2012-present.

Contributed a 35-minute talk on “Investigaciones del dosel del bosque utilizando drones” for Autoridad Aeronáutica Civil de Panama to celebrate the commemoration of el Día Meteorológico Mundial 2015. March 24, 2015.

Contributed a 20-minute talk on “Reservorios y flujos de carbono en bosques tropicales” for the STRI-INDICASAT science symposium, Panama City, Panama. May 22, 2014.

Contributed a 1-hour talk on “Spatial variation in forest biomass and consequences for remote sensing” for the regional workshop on forest monitoring GEO GFOI: methods for biomass estimation and forest-cover mapping in the tropics. Bogotá, Colombia December 3, 2013.

Gave a talk for the Barro Colorado Island tour guides on “Aerial imagery for ecology research.” October 29, 2013.

Gave a 15-minute talk in Spanish for the XXVIII Olimpiada Iberoamericana de Matematica on the subject of the usefulness of mathematics for data analysis and modeling in ecology and environmental science. September 26, 2012

Gave talk for a training workshop for Panamanian middle school teachers on “Las Dinámicas de los Bosques Tropicales y sus Reservorios de Carbono en un Mundo Cambiante” on February 17, 2012. Punta Culebra Exhibition Center, Panama City, Panama.

Gave public talk at the University of Panama geography symposium, on “Variación del Clima en la Isla de Barro Colorado y sus Efectos en el Bosque” on October 18, 2011. Panama City, Panama.

Gave public talk for the Smithsonian Tropical Research Institute Series “Conversaciones en el Smithsonian” on “Variación del Clima en la Isla de Barro Colorado y sus Efectos en el Bosque” on September 28, 2011. Panama City, Panama.

Gave public talk on “Forest carbon budgets and global change” at HSBC headquarters, London. March 31, 2011. Talk for HSBC employees including “Climate Champions”.

Gave talk on “Tropical forest dynamics and carbon budgets in a changing world”. Environmental Leadership and Training Initiative conference on REDD+: Technical, Socioeconomic and Political Dimensions. Panama City, Panama. April 7, 2011.

Gave public talk at Smithsonian Tropical Research Institute (Charla del Mes) on “Presupuestos de carbono en bosques tropicales y el cambio climático global” on May 6, 2009. The talk led to a long article in the Sunday edition of the major local newspaper, La Prensa, which appeared on May 16.

Gave talk for Barro Colorado Island tour guides on “Presupuestos de carbono en bosques tropicales y el cambio climático global” on April 29, 2009.

Outreach to Minnesota students through the Bell Museum of Natural History at the University of Minnesota as part of the 2003-04 JASON curriculum on “Rainforests at the Crossroads.”

## **OTHER SMITHSONIAN SERVICE**

Member of the short-term fellowship proposal review committee. September 2016 – present.

Member of STRI’s Scientific Council, an appointed committee which advises STRI’s directors. October 2013 – August 2015.

Chair of STRI’s Tupper seminar program. Recruited internal speakers, solicited nominations for invited speakers, and organized the schedule. 2011 – 2015.

Chair of the Center for Tropical Forest Science working group on carbon dynamics, and lead author of the resulting 25-year plan for carbon dynamics research on CTFS plots. 2006.

Gave talks for the Fundacion Smithsonian and STRI advisory board as requested. January 8, 2013: “Carbon budgets of tropical forests.” September 18, 2013: “A high resolution carbon map of Panama.”

Ad hoc reviewer of internal Smithsonian fellowship proposals, ongoing.



Review committee for STRI's Senior Latin American fellowships, February 2016.

## **TEACHING EXPERIENCE**

**Ecology**, University of Minnesota (BIOL 3407). Taught large (>100 students) undergraduate lecture and lab course for biology majors. Fall 2007, Fall 2005; cotaught in Fall 2004 with David Tilman.

**Ecology Theory and Concepts**, University of Minnesota (EEB 5503). Co-taught graduate course in ecological theory with David Tilman. Fall 2006.

**Plant Functional Traits**, University of Minnesota. Co-led graduate seminar with Peter Reich, Jeannine Cavender-Bares, Jennifer Powers and Rebecca Montgomery. Fall 2007.

**Influences of Natural Enemies on Plant Diversity**, University of Minnesota. Co-led graduate seminar with Linda Kinkel. Fall 2005.

**Fundamental Papers in Ecology**. Co-designed a semester-long course on fundamental papers in ecology for graduate students. Fall 2005.

**Comparing Temperate and Tropical Plant Communities**, University of Minnesota. Co-led graduate seminar with David Tilman. Fall 2004.

**La Lluvia de Semillas en Bosques Tropicales**. Guest lecture, field ecology course for Panamanian biology undergraduates. Smithsonian Tropical Research Institute. August 1, 2006.

**Methods for Studying Seed Dispersal Patterns and Their Consequences**, workshops presented to colleagues and students in Quito, Ecuador (April 29-30, 2003, Pontificia Universidad Católica del Ecuador, presented in Spanish) and in Pasoh, Malaysia (August 8, 2003, Pasoh Forest Reserve, Forest Research Institute, presented in English).

**Orientation and Introduction to Teaching**, McGraw Center for Teaching and Learning, Princeton University. Led workshops on teaching for new graduate teaching assistants. August 2000.

**Distribuciones, Pruebas de Normalidad y Transformaciones**. Guest lecture, statistics course for Panamanian biology undergraduates. Smithsonian Tropical Research Institute. March 25, 2005.

**Population and Community Ecology**, Princeton University. Selected readings and led weekly discussion sections covering applied issues in ecology, in consultation with professors Simon Levin and Steve Pacala; graded exams and final papers. Fall 1999.

**Teorías de la Diversidad de Árboles y Como les Han Probado a BCI**. Guest lecture, student-organized field ecology course. Smithsonian Tropical Research Institute. July 25, 1999.

**Tropical Ecology and Conservation**, Princeton University. Led field trips and field exercises, taught basic statistics, advised students about individual and group projects, and graded lab reports, in a 6-week Panama-based field course in tropical forest ecology and conservation as a teaching assistant for professor Steve Hubbell. Spring 1998.

**Genetic Diversity of Natural Populations**, Princeton University. Designed problem sets and taught basic population genetics as part of a 3-week intensive course in genetics as a teaching assistant for professor Hope Hollocher in Panama. Spring 1998.

**Biology of Organisms**, Princeton University. Taught two laboratory sections of an introductory biology course as a teaching assistant for professor Jim Gould. Fall 1995.

## **LANGUAGES**

English – native tongue, fluent

Spanish - functional

German - conversational

French - reading