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## Ryan A. Chisholm

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### EDUCATION

**Princeton University**, Princeton, New Jersey, USA

- Ph.D., Ecology and Evolutionary Biology, Advisor: Simon Levin 2010
- M.A., Ecology and Evolutionary Biology 2007

**University of Melbourne**, Melbourne, Australia

- B.Sc., Mathematics and Statistics (Honours in Botany), Advisor: Mark Burgman 2001 (2004)
  - B.A., German 2001
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### APPOINTMENTS

**National University of Singapore**, Singapore

- Assistant Professor, Department of Biological Sciences 2012 – present

**Smithsonian Tropical Research Institute**, Panama

- Research associate 2012 – present
  - Post-doctoral researcher: “Tropical Forest Dynamics and Global Change” 2010 – 2012
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### TEACHING EXPERIENCE

**National University of Singapore**, Singapore

- Course co-designer and co-lecturer: *Evolution* (first-year undergraduate course) 2016 – present
  - Course designer and lecturer: *Methods in Mathematical Biology* (fourth-year undergraduate course) 2014 – present
  - Course designer and lecturer: *Theoretical Biology* (graduate course) 2013 – present
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### AWARDS, FELLOWSHIPS AND GRANTS

- National Research Foundation of Singapore–Israel Science Foundation Joint Grant: A unified framework for stochastic ecological models of plant communities driven by temporal environmental stochasticity 2018–2021
- James S. McDonnell Foundation Studying Complex Systems Scholar Award: Modeling complex ecological communities: From small islands to tropical forests 2016–2021
- Singapore Ministry of Education Tier 1 grant: Quantifying undetected extinctions in an era of global change 2016–2018
- National University of Singapore Faculty of Science Young Scientist Award 2014
- Singapore Ministry of Education Tier 1 grant: Effect of spatial patterns of habitat loss on species loss in Southeast Asia 2013–2016
- National University of Singapore Faculty of Science start-up grant: Tropical forest dynamics and global change 2012–2015
- National University of Singapore Department of Biological Sciences start-up grant: Environmental drivers of tropical tree community dynamics 2012–2015

- Center for Tropical Forest Science – Smithsonian Institution Global Earth Observatories Postdoctoral Fellowship 2010–2012
- Award for Outstanding Teaching by a Graduate Student, Department of Ecology and Evolutionary Biology, Princeton University 2009
- Africa Grand Challenge Research Grant 2008–2009
- David Gardner '69 Research Grant 2008–2009
- Robert May Fellowship, Princeton University 2005–2006
- Bruce Knox Honours Prize, University of Melbourne 2004

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## PUBLICATIONS

*Peer reviewed*

- **Chisholm, R. A.**, F. Lim, Y. S. Yeoh, W. W. Seah, R. Condit, and J. Rosindell. 2018. Species–area relationships and biodiversity loss in fragmented landscapes. *Ecology Letters* (in press)
- Belcher, R. N., and **R. A. Chisholm**. 2018. Tropical vegetation and residential property value: a hedonic pricing analysis in Singapore. *Ecological Economics* (in press)
- Fung, T., J. P. O’Dwyer, and **R. A. Chisholm**. 2017. Quantifying species extinction risk under temporal environmental variance. *Ecological Complexity* (in press)
- Lin, Y., L. Wijedasa, and **R. A. Chisholm**. 2017. Singapore’s willingness to pay for mitigation of transboundary forest-fire haze from Indonesia. *Environmental Research Letters* 12:024017
- Fung, T., J. P. O’Dwyer, and **R. A. Chisholm**. 2017. Species-abundance distributions under colored environmental noise. *Journal of Mathematical Biology* 74:289–311
- **Chisholm, R. A.**, T. Fung, D. Chimalakonda, and J. P. O’Dwyer. 2016. Maintenance of biodiversity on islands. *Proceedings of the Royal Society B* 283
- Fung, T., J. P. O’Dwyer, K. Abd. Rahman, C. D. Fletcher, and **R. A. Chisholm**. 2016. Reproducing static and dynamic biodiversity patterns in tropical forests: the critical role of environmental variance. *Ecology* 95:1207–1217
- **Chisholm, R. A.**, L. S. Wijedasa, and T. Swinfield. 2016. The need for long-term remedies for Indonesia’s forest fires. *Conservation Biology* 30:5–6
- **Chisholm, R. A.**, X. Giam, K. Sadanandan, T. Fung, and F. E. Rheindt. 2016. A robust non-parametric method for quantifying undetected extinctions. *Conservation Biology* 30:610–617
- Bourguignon T., **R. A. Chisholm**, and T. A. Evans. 2016. The termite ‘worker’ phenotype evolved as a dispersal strategy for fertile wingless individuals before eusociality. *American Naturalist* 187:372–387
- **Chisholm, R. A.**, D. N. L. Menge, T. Fung, N. S. G. Williams, and S. A. Levin. 2015. The potential for alternative stable states in nutrient-enriched invaded grasslands. *Theoretical Ecology* 8:399–417
- Fung T., L. Villain, and **R. A. Chisholm**. 2015. Analytical formulae for computing dominance from species-abundance distributions. *Journal of Theoretical Biology* 386:147–158
- Bewick, S., **R. A. Chisholm**, E. Akçay, and W. Godsoe. 2015. A stochastic biodiversity model with overlapping niche structure. *Theoretical Ecology* 8:81–109
- O’Dwyer, J. P. and **R. A. Chisholm**. 2014. A mean field model for competition: from neutral ecology to the Red Queen. *Ecology Letters* 17:961–969

- **Chisholm, R. A.**, R. Condit, K. Abdul Rahman, P. J. Baker, S. Bunyavejchewin, Y.-Y. Chen, G. Chuyong, H. S. Dattaraja, S. Davies, C. E. N. Ewango, C. V. S. Gunatilleke, I. A. U. N. Gunatilleke, S. P. Hubbell, D. Kenfack, S. Kiratiprayoon, Y. Lin, J.-R. Makana, N. Pongpattananurak, S. Pulla, R. Punchi-Manage, R. Sukumar, S.-H. Su, I.-F. Sun, H. S. Suresh, S. Tan, D. Thomas, and S. Yap. 2014. Temporal variability of forest communities: empirical estimates of population change in 4000 tree species. *Ecology Letters* 17:855–865
- **Chisholm, R. A.** and J. P. O’Dwyer. 2014. Species ages in neutral biodiversity models. *Theoretical Population Biology* 93:85–94
- Muller-Landau, H. C., M. Detto, **R. A. Chisholm**, and R. Condit. 2014. Detecting and predicting global change influences on forest biomass. In *Forests and Global Change*, British Ecological Society 381–415
- **Chisholm, R. A.**, J. Cui, S. K. Y. Lum, and B. M. Chen. 2013. UAV LiDAR for below-canopy forest surveys. *Journal of Unmanned Vehicle Systems* 1:61–68
- Bai, F., **R. A. Chisholm**, W. Sang, and M. Dong. 2013. Spatial risk assessment of alien invasive plants in China. 2013. *Environmental Science and Technology*. 47:7624–7632
- **Chisholm, R. A.**, H. C. Muller-Landau, K. Abdul 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, N. Gunatilleke, S. 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. Mohd. Razman, M. D. Morecroft, C. J. Nytch, 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* 101:1214–1224
- Mills, A. J., S. C. Birch, R. Stanway, O. Huyser, **R. A. Chisholm**, C. Sirami, and D. Spear. 2013. Capturing carbon and connecting renosterveld: a practical conservation approach for the Overberg, Cape Floristic Region, South Africa. *Conservation Letters* 6:255–263
- Condit, R., **R. A. Chisholm**, and S. P. Hubbell. 2012. Thirty years of forest census at Barro Colorado and the importance of immigration in maintaining diversity. *PLOS ONE* 7(11): e49826
- **Chisholm, R. A.** and S. A. Levin. 2012. Linking dispersal and immigration in multi-dimensional environments. *Bulletin of Mathematical Biology* 8:1754–1763
- **Chisholm, R. A.** and B. A. Wintle. 2012. Choosing ecosystem service investments that are robust to uncertainty in multiple parameters. *Ecological Applications* 22:697–704
- **Chisholm, R. A.** 2011. Time-dependent solutions of the spatially implicit neutral model of biodiversity. *Theoretical Population Biology* 80:71–79
- **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
- **Chisholm, R. A.** and S. W. Pacala. 2011. Theory predicts a rapid transition from niche-structured to neutral biodiversity patterns across a speciation-rate gradient. *Theoretical Ecology* 4:195–200
- **Chisholm, R. A.** and S. W. Pacala. 2010. Niche and neutral models predict asymptotically equivalent species abundance distributions in high-diversity ecological communities. *Proceedings of the National Academy of Sciences* 107:15821–15825
- **Chisholm, R. A.** 2010. Tradeoffs between ecosystem services: water and carbon in a biodiversity hotspot. *Ecological Economics* 69:1973–1987

- **Chisholm, R. A.** and R. J. Taylor. 2010. Body size and extinction risk in Australian mammals: an information-theoretic approach. *Austral Ecology* 35:616–623
- **Chisholm, R. A.** and J. W. Lichstein. 2009. Linking dispersal, immigration and scale in the neutral theory of biodiversity. *Ecology Letters* 12:1385–1393
- **Chisholm, R. A.** 2009. The Ecology, Economics and Management of Alien Invasive Species. In: Levin, S. A. (ed.), *The Princeton Guide to Ecology*. Princeton University Press. pp. 731–739
- Bekessy, S. A., B. A. Wintle, A. Gordon, J. C. Fox, **R. Chisholm**, B. Brown, T. Regan, N. Mooney, S. M. Read, and M. A. Burgman. 2009. Modelling human impacts on the Tasmanian Wedge-tailed Eagle (*Aquila audax fleayi*). *Biological Conservation* 142:2438–2448
- **Chisholm, R. A.** and E. Filotas. 2009. Critical slowing down as an indicator of transitions in two-species models. *Journal of Theoretical Biology* 257:142–149
- Bekessy, S., B. Wintle, A. Gordon, **R. Chisholm**, L. Venier, and J. Pearce. 2008. Dynamic Landscape Meta-population Models and Sustainable Forest Management. In J. Millsaugh and F. Thompson, editors. *Models for Planning Wildlife Conservation in Large Landscapes*. Elsevier Science, The Netherlands. pp. 473–500
- **Chisholm, R. A.**, and R. J. Taylor. 2007. Null-hypothesis significance testing and the critical weight range for Australian mammals. *Conservation Biology* 21:1641–1645
- **Chisholm, R. A.** 2007. Sampling species abundance distributions: Resolving the veil-line debate. *Journal of Theoretical Biology* 247:600–607
- **Chisholm, R. A.**, and B. A. Wintle. 2007. Incorporating landscape stochasticity into population viability analysis. *Ecological Applications* 17:317–322
- Taylor, R. J., and **R. A. Chisholm**. 2005. The occurrence of hollows in eucalypts and Ironwood (*Erythrophleum chlorostachys*) in the Gulf region of the Northern Territory and its implications for timber harvesting. *Pacific Conservation Biology* 11:57–63
- Wintle, B. A., S. A. Bekessy, L. A. Venier, J. L. Pearce, and **R. A. Chisholm**. 2005. Utility of dynamic landscape metapopulation models for sustainable forest management. *Conservation Biology* 196:1930–1943
- **Chisholm, R. A.** and M. A. Burgman. 2004. The unified neutral theory of biodiversity and biogeography: comment. *Ecology* 85:3172–3174

#### *Other*

- **Chisholm, R. A.** 2015. Lessons on diversity from a temperate biome (book review). *Ecology* 96:2314–2315
- O’Dwyer, J. P. and **R. A. Chisholm**. 2013. Neutral Theory and Beyond. In: Levin, S. A. (ed.), *Encyclopedia of Biodiversity*, 2nd edition, Volume 5. Elsevier. pp. 510–518
- **Chisholm, R. A.** and S. W. Pacala. 2011. Independent species in independent niches behave neutrally: Response. *Oikos* 120:964–965
- **Chisholm, R. A.** 2010. Exponential growth in invasion biology (book review). *Bioscience* 60:314–315

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#### CONFERENCE PRESENTATIONS

- Ecological Society of America Annual Meeting. Portland OR, USA. August 2017.
- International Congress for Conservation Biology. Cartagena, Colombia. July 2017.

- Conservation Asia. Singapore. June 2016.
- Association for Tropical Biology and Conservation Asia-Pacific Chapter (plenary). Phnom Penh, Cambodia. April 2015.
- Ecological Society of America Annual Meeting. Sacramento CA, USA. August 2014.
- Association for Tropical Biology and Conservation Annual Meeting. Cairns QLD, Australia. July 2014.
- Society for Industrial and Applied Mathematics Annual Meeting. San Diego CA, USA. July 2013.
- Ecological Society of America Annual Meeting. Portland OR, USA. August 2012.
- Workshop on Critical Transitions in Complex Systems. Imperial College London. London, UK. March 2012.
- Ecological Society of America Annual Meeting. Austin TX, USA. August 2011.
- IUCN International Symposium on Climate Change and Forest Biodiversity Conservation. Beijing, China. July 2011.
- European Conference on Mathematical and Theoretical Biology. Kraków, Poland. July 2011.
- Ecological Society of America Annual Meeting. Pittsburgh PA, USA. August 2010.
- International Congress for Conservation Biology. Edmonton AB, Canada. July 2010.
- World Congress of Environmental and Resource Economists. Montreal QC, Canada. June 2010.
- Fynbos Forum. Oudtshoorn, South Africa. August 2008.
- New England Complex Systems Institute. Boston MA, USA. October 2007.
- Fynbos Forum. Langebaan, South Africa. August 2007.

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## SERVICE

- Associate editor for *Methods in Ecology and Evolution* Sep 2013 – present
- Handling editor for *Conservation Biology* Apr 2013 – present
- Faculty member of F1000 within the Theoretical Ecology section Sep 2011 – present
- Reviewer for journals including *Nature*, *Science*, *Proceedings of the National Academy of Sciences*, *American Naturalist*, *Ecology Letters*, *Nature Communications*, *Ecology*, *Proceedings of the Royal Society B*, *Conservation Biology*, *Theoretical Population Biology*, *Ecological Economics*, *EPL (Europhysics Letters)*, *Physics Letters A*, *Journal of Theoretical Biology*, *Theoretical Ecology*
- Reviewer: Springer-Verlag, Sinauer, National Science Foundation
- Membership of professional organisations: Ecological Society of America, Society for Conservation Biology

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## LANGUAGES

- German (professional working proficiency)
  - Spanish (professional working proficiency)
  - Indonesian/Malay (limited working proficiency)
  - Mandarin (elementary proficiency)
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