

ROBERT MCDONALD
Vanguard Scientist
The Nature Conservancy
4245 North Fairfax Drive,
Arlington, VA 22203
+1 703-841-2093
rob_mcdonald@TNC.ORG

Research Themes: Urbanization and its ecological effects; Land-use planning and conservation; Sustainable agriculture; Energy policy and land-use change.

EDUCATION

DOCTOR OF PHILOSOPHY, May 2004

University Program in Ecology
The Graduate School
Duke University, Durham, NC

Dissertation: Forest fragmentation and forest response in the North Carolina Piedmont.

Concentration: Carbon sequestration, forest conservation, land-use change, landscape ecology, remote sensing.

Awards: Aleane Webb Fellowship for excellence in Duke University Doctoral Research, 2003; NASA-MSU Travel Grant, International Association of Landscape Ecology Annual Meeting, 2002; National Science Foundation Pre-Doctoral Research Fellowship, 2001-2004; James B. Duke Fellowship for Academic Excellence, 2000; Bill and Melinda Gates Fellowship for Interdisciplinary Research, 2000.

BACHELOR OF SCIENCE, *cum laude*, June 2000

University of North Carolina at Chapel Hill

Major: Biology *Minor:* Chemistry.

Honors thesis: Increased dominance by *Acer rubrum* and the decline of the *Quercus-Carya* climax in the North Carolina Piedmont.

Honors: J.N. Couch Award for Excellence in Undergraduate Research, 2000; F.J. LeClair Award for Excellence in Botanical Research, 2000; Phi Beta Kappa, 1999; Order of the Golden Key, 1999.

PROFESSIONAL EXPERIENCE

Vanguard Scientist, The Nature Conservancy

Leads the Conservancy's efforts to develop new strategies to deal with threats to biodiversity from agriculture, transportation, urban development, and energy policy. Currently conducting a review of the Conservancy's global agriculture policy, and setting global priorities for new conservation actions. Also provides science support to our climate change team, particularly thinking about how energy policy will affect biodiversity. 2008- Present.

David H. Smith Conservation Biology Fellow, GSD, Harvard University

Researched the implications of urbanization on ecosystem services, at scales ranging from the local to the global. Particular focus on the implications of urban growth for conservation planning, in conjunction with scientists at The Nature Conservancy. Full responsibility for project and budget management. 2006 – 2008.

Postdoctoral Fellow, Harvard Forest, Harvard University

Lead a research project examining the landscape-scale effects of forest harvesting and forest conversion on biodiversity and invasive species spread in western Massachusetts. Designed a research protocol to meet the diverse needs of the scientists involved with the project, which addressed the heterogeneity of forest harvesting practices in the state. Implemented the protocol, managing a crew of five and insuring that adequate resources and logistical support were available. 2004-2006.

Christine Mirzayan Science Policy Intern, National Academy of Sciences
Synthesized research on the effects of land-use change, nitrogen deposition, and carbon fertilization on terrestrial carbon sequestration. Designed a workshop to explore the implications of limited scientific knowledge of these effects for the development of national carbon inventories, and prioritized further research to be funded. Summer 2003.

Triangle Research Initiative Research Associate, Duke University
Compiled and organized a geospatial database of information relevant to a broad array of economists, land-use planners, and ecologists who do research in the Raleigh-Durham metropolitan area. Converted all data layers to a common geographic projection, and generated metadata where needed. Classified a time-series of Thematic Mapper images for use by a variety of researchers. 2000-2003.

Duke Forest Data Archivist, University of North Carolina
Served as the archivist for all long-term forestry data from the Duke Forest, an active research site since 1938. Filled in data gaps, and converted records to a common electronic format. Designed SAS programs to automate further updates of the database and to provide common analysis products in a timely fashion. 1998-2000.

Forest Ecology Research Assistant, Hampshire College
Mapped locations of old growth-forests in Massachusetts, and prepared an extensive bibliography and course materials for a class on the subject. Studied decomposition rates in compost piles under different conditions. 1997-1998.

TEACHING EXPERIENCE

Lecturer, Harvard University
Landscape Ecology: Techniques for applying landscape ecology principles to the design of more sustainable cities and urban regions. Emphasis on the conceptual, not the statistical aspects of the discipline. Class included field studies at the Sargent Center, New Hampshire. I had full responsibility for designing the course syllabus to be relevant to landscape architects and urban planners.
Occasional guest lectures: Delivered by request of faculty in the Graduate School of Design (Richard Forman, PAES Professor of Advanced Environmental Studies in Landscape Ecology) and Harvard Engineering & Applied Science (Sumeeta Srinivasan, Lecturer on Engineering Sciences). Topics include the effects of urbanization on ecological systems, and modeling species habitat using GIS systems.

Student mentor, Harvard University
Harvard Forest: Mentored four undergraduates participating in Harvard Forest's Research Experience for Undergraduate program, helping them perform innovative scientific research, conduct an analysis of their choosing, and present their results at a professional seminar. One of these undergraduates has continued to collaborate, and went on to expand the analysis into an honors thesis at her university.
Graduate School of Design: Regular work serving on studio review panels for landscape architecture and urban planning students, to provide an ecological criticism of their work. Occasional mentoring of doctoral candidates in the department who need ecological expertise.

Graduate-Level Teaching Assistant, Duke University
Landscape Ecology: Emphasis on the role of spatial heterogeneity in terrestrial systems: its detection and description, agents of pattern formation, landscape dynamics and models, and the implications of heterogeneity for populations, communities, and ecosystems.
Spatial Analysis in Ecology: Techniques for interpreting spatial data, including scaling techniques, pattern analysis, indices of patchiness (adjacency, contagion), and inferential methods (cross-correlation, permutation procedures).
Multivariate Analysis in Community and Landscape Ecology: Statistical methods for interpreting multivariate ecological datasets, with an emphasis on using modern UNIX and PC-based statistical software.

PROFESSIONAL Reviewer for *Biological Conservation*, *Ecography*, *Ecological Applications*, *Ecological Modeling*, *Journal of Ecology*, *Journal of Vegetation Science*, *Landscape Ecology*, *Proceedings of the National Academies of Science*, and the National Science Foundation.

Invited participant in the prestigious Cary Conference, 2007 (Institute of Ecosystem Studies, Millbrook, NY), helping bridge the gap between urban ecology and urban design.

Invited participant in an EPA-funded Workshop on Scaling and Uncertainty Analysis in Ecological Studies
http://leml.asu.edu/jingle/misc/2002_ScalingWksp_prog.pdf

Invited participant in an NSF-funded Workshop on Journalists/Scientists Science Communications and the News Media
http://environmentwriter.org/resources/reports/November03_workshop.htm

Attended a meeting of the Society of Conservation Biology Board of Governors as a non-voting representative of the Smith Fellows Program, Port Elizabeth, South Africa.

Former participant in NSF's LTER site at Harvard Forest:
<http://harvardforest.fas.harvard.edu/research/lter.html>

Former participant in the Agriculture Landscapes in Transition program of the NSF, which includes an evaluation of the effectiveness of conservation easements as a conservation tool:
<http://ces.asu.edu/AGTRANS/>

Gained extensive field experience on community ecology studies in Big Bend National Park (TX), Sequoia/Kings Canyon National Park (CA), and Everglades National Park (FL). Led multiple research crews working on resurveying a network of long-term forest research plots in the Duke Forest (NC). 1997-2003.

PUBLICATIONS Denning, C., R.I. McDonald, and J. Christensen. 2010. Did land protection in Silicon Valley reduce the housing stock? *Biological Conservation* 143:1087-1093.

McDonald, R.I., R.T.T. Forman, and P. Kareiva. 2010. Open space loss and land inequality in United States' cities, 1990-2000. *PLoS One* 5(3):e9509.

McDonald, R.I. 2009. The promise and pitfalls of systematic conservation planning. *Proceedings of the National Academies of Science* 106(36): 15101-15102.

McDonald, R.I., J. Fargione, J. Kiesecker, W. Miller, and J. Powell. 2009. Energy sprawl or energy efficiency: climate policy impacts on natural habitat for the United States of America. *PLoS One* 4(8):e6802. Media coverage: [New York Times](#), [NPR](#), [Bloomberg News](#). The term was picked up in the Congressional [debate](#) on climate change, and was the subject of an editorial in the [Wall Street Journal](#).

McDonald, R. I., R. Forman, P. Kareiva, R. Neugarten, D. Salzer, and J. Fisher. 2009. Urban effects, distance, and protected areas in an urbanizing world. *Landscape and Urban Planning* 93:63-75.

McDonald, R. I. 2009. Ecosystem service demand and supply along the urban-to-rural gradient. *Journal of Conservation Planning* 5: 1-14.

McDonald, R.I. 2009. Ecopolis: architecture and cities for a changing climate (book review). *Landscape Ecology* 24(6): 849-850.

McDonald, R.I., P. Kareiva, and R.T.T. Forman. 2008. The Implications of Current and Future Urbanization for Global Protected Areas and Biodiversity Conservation. *Biological Conservation* 141:1695-1703.

Minor, E.S., R.I McDonald, E.A. Treml, and D.L. Urban. 2008. Uncertainty in spatially explicit population models. *Biological Conservation* 141:956-970.

McDonald, R.I., G. Motzkin, and D.R. Foster. 2008. Assessing the influence of historical factors, contemporary processes, and environmental conditions on the

- distribution of invasive species. *Journal of the Torrey Botanical Society* 135(2):259-270.
- McDonald, R.I., G. Motzkin, and D.R. Foster. 2008. The effect of logging on vegetation composition in Western Massachusetts. *Forest Ecology and Management* 255:4021-4031.
- McDonald, R.I. 2008. Global urbanization: Can ecologists identify a sustainable way forward? *Frontiers in Ecology and the Environment* 6(2):99-104.
- McDonald, R.I. 2008. Why Conservation is Failing (book review). *Landscape Ecology* 23:373-374.
- McDonald, R.I., C. Yuan-Farrell, C. Fievet, M. Moeller, P. Kareiva, D. Foster, T. Gragson, A. Kinzig, L. Kuby, and C. Redman. 2007. Estimating the effect of protected lands on the development and conservation of their surroundings. *Conservation Biology* 21 (6): 1526-1536.
- McKnight, M.W., P.S. White, R.I. McDonald, J.F. Lamoreux, W. Sechrest, R.S. Ridgely, and S.N. Stuart. 2007. Putting Beta-Diversity on the Map: Broad-Scale Congruence and Coincidence in the Extremes. *Public Library of Science- Biology* 5(10): e272. doi:10.1371/journal.pbio.0050272.
- McDonald, R.I. 2007. The Land We Share (book review). *Landscape Ecology* 22:1107-1108.
- Kareiva, P., S. Watts, R.I. McDonald, and T. Boucher. 2007. Domesticated Nature: Shaping Landscapes and Ecosystems for Human Welfare. *Science* 316: 1866-1869. Referenced in the [New York Times](#).
- Forman, R.T.T., and R.I. McDonald. 2007. A Massive Increase In Roadside Woody Vegetation: Goals, Pros, and Cons. *Proceedings of International Conference on Ecology and Transportation*.
- McDonald, R.I., P.N. Halpin, and D.L. Urban. 2007. Determination of successional trends from remote sensing imagery. *Applied Vegetation Science* 10:193-203.
- Soininen, J., R.I. McDonald and H. Hillebrand. 2007. The distance decay of similarity in ecological communities. *Ecography* 30: 3-12.
- McDonald, R.I. 2007. A world of the city, by the city, for the city. In J. Harf, M. Lombardi (eds.). *Taking Sides: Clashing views in global issues*, 4th Edition. McGraw-Hill, New York.
- McDonald, R. I. 2006. Predicting the unknown: rates of environmental problem generation over time. *The Environmentalist* 26: 221-225.
- McDonald, R.I. 2006. Sustainable development as freedom. *International Journal of Sustainable Development and World Ecology* 13: 445-447.
- McDonald, R.I., M.S. Bank, D.B. Kittredge, G. Motzkin, and D.R. Foster. 2006. Forest Harvesting and Deforestation Relationships over Two Decades in Massachusetts. *Forest Ecology and Management* 227:31-41.
- McDonald, R. I., and D. L. Urban. 2006. Forest Edges and Forest Composition in the North Carolina Piedmont. *Biological Invasions* 8:1049-1060.
- Urban, D. L., R. I. McDonald, E. S. Minor, and E. A. Treml. 2006. Causes and consequences of land use change in the North Carolina Piedmont. In J. Wu, B. Jones, H. Li, and O.L. Loucks (eds.). *Scaling and Uncertainty Analysis in Ecological Studies*, Springer, Dordrecht, The Netherlands.
- McDonald, R.I., and D.L. Urban. 2006. Spatially varying rules of landscape change: lessons from a case study. *Landscape and Urban Planning* 74(1): 7-20.

Mansfield, C., S. Pattanayak, W. McDow, R. I. McDonald, and P. N. Halpin 2005. Shades of green: Measuring the value of urban forests in the housing market. *Journal of Forest Economics* 11(3): 177-199.

McDonald, R.I., M. McKnight, D. Weiss, E. Selig, M. O'Connor, C. Violin, and A. Moody. 2005. Species compositional similarity and ecoregions: Do ecoregion boundaries represent zones of high species turnover? *Biological Conservation* 126: 24-40.

McDonald, R. I., and D. L. Urban. 2004. Forest edges and tree growth rates in the North Carolina Piedmont. *Ecology* 85(8): 2258-2266.

Taverna, K., D.L. Urban, and R.I. McDonald. 2004. Modeling landscape vegetation pattern in response to historic land-use: A hypothesis-driven approach for the North Carolina Piedmont. *Landscape Ecology* 20: 689-702.

McDonald, R. I., R. K. Peet, and D. L. Urban. 2003. Spatial pattern of oak regeneration limitation in a complex forest environment. *Journal of Vegetation Science* 14:441-450.

McDonald, R. I., R. K. Peet, and D. L. Urban. 2002. Environmental correlates of oak decline and red maple increase in the North Carolina Piedmont. *Castanea* 67:84-95.

REPORTS

McDonald, R.I. and J. Hoekstra. 2008. *A review of TNC agricultural challenges and strategies*. <http://conserveonline.org/workspaces/tnc.agriculture/documents/a-review-of-tnc-agriculture-challenges-and/view.html>

PRESENTATIONS

McDonald, R.I. 2010. Conservation planning at The Nature Conservancy- from global to local. Fish and Wildlife Service, Arlington, VA (Invited talk).

McDonald, R.I. 2009. Sustainable Development and Agriculture (A Conservationist Perspective). BIO Conference, Atlanta (Invited talk).

McDonald, R.I. 2008. Positive and Negative Effects of Urban Areas on Conservation Areas. Society for Conservation Biology, Chattanooga.

McDonald, R.I. 2008. Global urbanization: Can ecologists identify a sustainable way forward? Resilience 2008 Conference, University of Stockholm, Sweden (Invited talk).

McDonald, R.I. 2007. The Implications of Urban Growth for Global Protected Areas and Biodiversity Conservation. Society for Conservation Biology, Port Elizabeth, South Africa.

McDonald, R.I. 2007. Estimating the effect of protected lands on the development and conservation of their surroundings. International Association of Landscape Ecology, Ede, The Netherlands (Poster).

McDonald, R.I. 2007. Environmental conservation in an urbanizing world. Landscape Lunchbox Seminar Series, Graduate School of Design, Harvard University, Cambridge (Invited talk).

McDonald, R. I. 2006. Forest harvesting and land conversion over two decades in Massachusetts. International Association of Landscape Ecology, US Chapter, San Deigo.

McDonald, R. I. 2006. Land-use legacies, present-day fragmentation, and invasive species . Society for Conservation Biology, San Jose.

McDonald, R. I. 2005. Urban sprawl and its effects on forest harvesting and forest processes. Institute of Ecosystem Studies, Millbrook (Invited talk with honorarium).

McDonald, R. I. 2005. Species compositional similarity and ecoregions. Ecological Society of America, Montreal.

McDonald, R.I. 2005. Causes and Consequences of Forest Fragmentation in the

North Carolina Piedmont. International Urban-Rural Interfaces Conference, Atlanta.

McDonald, R.I. 2005. Urban sprawl and its effect on forest harvesting in Massachusetts. Assumption College, Worcester (Invited talk with honorarium).

McDonald, R.I. 2004. Causes and Consequences of Forest Fragmentation. The Woods Hole Research Center, Woods Hole (Invited talk).

McDonald, R.I. 2004. Causes and Consequences of Forest Fragmentation: Lessons from a landscape ecology perspective. Boston University Geography Department, Boston (Invited talk).

McDonald, R.I., P.N. Halpin, and D.L. Urban. 2004. Observing succession from space: a case study from the North Carolina Piedmont. International Association of Landscape Ecology, US Chapter, Las Vegas.

McDonald, Robert and D.L. Urban. 2003. Effects of Forest Edges on Woody Plant Composition in the North Carolina Piedmont: A Landscape Approach. Society for Conservation Biology, Duluth.

McDonald, Robert and D.L. Urban. 2003. Effects of Forest Edges on Plant Growth Rates. Ecological Society of America, Savannah.

FORTHCOMING MANUSCRIPTS

McDonald, R.I. and P. Marcotullio. *in press*. Global effects of urbanization on ecosystem services. In T. Elmquist et al. (eds.). *Handbook of Urban Ecology*, Oxford University Press, Oxford, UK.

McDonald, R.I. and T. Boucher. *In revision*. Global development and the future of the protected areas strategy. *Biological Conservation*.

ADDITIONAL INFORMATION

Skilled in the use of ESRI GIS products, ERDAS IMAGINE, Unix operating systems, Splunk, R, SAS, Excel, PowerPoint, and EndNote. Competent in FORTRAN, C, Visual Basic, and HTML.

Proficient in French.

Blogs regularly on [Cool Green Science](#). Essays on ecological topics have been published online at Znet and Urban Cartography.

Numerous interviews in print, radio, and on [television](#).

Writes short stories and poetry, including several stories published online at [Badosa.com](#).

Published a letter to the editor to The Chapel Hill News, discussing global warming and the presidential campaign.