

Curriculum Vitae

Ruth S. DeFries

Ecology, Evolution, and Environmental Biology
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Current Appointment

Denning Professor of Sustainable Development, Columbia University (2008-present)
Co-director, undergraduate program in Sustainable Development, Earth Institute (2010-present)

Research Interests

Consequences of anthropogenic land use change on ecological processes;
Characterization of land cover and anthropogenic land use change with remote sensing;
Interactions between human activities, the land surface, and ecosystem services that regulate the Earth's habitability.

Education

Ph.D. (1980)
Department of Geography and Environmental Engineering
Johns Hopkins University, Baltimore, MD

B.A., *summa cum laude* (1976)
Washington University, St. Louis, MO (major in earth science)

Fellowships and Honors

MacArthur Fellowship, 2007
Member, National Academy of Sciences (elected 2006)
Fellow, Ecological Society of America (elected 2012)
Fellow, American Academy of Sciences (elected 2010)
Fellow, American Geophysical Union (2009)
Fellow, American Association for the Advancement of Science (elected 2008)
Fellow, Aldo Leopold Leadership Program of the Ecological Society of America (2001)
Fulbright Award for Research in India (2007)
Phi Beta Kappa

Previous Appointments

Chair, Department of Ecology, Evolution and Environmental Biology (2011-2014)

Associate Professor and Professor (Aug 1999 - 2008)
University of Maryland, College Park
Joint appointment in Department of Geography (50%) and Earth System Science Interdisciplinary Center (50%)

Associate Research Scientist (Aug 1991 - Aug 1999; 1991-97 60%; 97-99 80%)
Department of Geography, University of Maryland, College Park

Visiting scientist (June - Aug 1998)
Carnegie Institution of Washington, Department of Plant Biology, Palo Alto, CA

Senior Project Officer (June 1983 - Aug 1991)
National Research Council, Washington, D.C.

Research Associate (Feb 1981 - March 1983)
Environmental Science and Engineering Group
Indian Institute of Technology, Bombay, India

Hydrologist (Oct 1979 - Oct 1980)
United States Geological Survey, Baltimore, MD

Journal Articles (*=first author is student or postdoc)

- Remans, R., Wood, S., Saha, N., Anderman, T., and DeFries, R. in press. Measuring nutritional diversity of national food supplies. *Global Food Security*.
- *Mondal, P., Jain, M., DeFries, R., Galford, G., and Small, C. in press. Sensitivity of crop cover to climate variability: Insights from two Indian agro-ecoregions. *Journal of Environmental Management*.
- *Marlier, M., R. DeFries, Pennington, D., E. Nelson, E. Ordway, J. Lewis, S. Kolpitz and L. Mickley. in press. Future fire emissions associated with projected land use change in Sumatra. *Global Change Biology*.
- *Anderman, T., Remans, R., Wood, S., DeRosa, K., and DeFries, R. in press, Synergies and tradeoffs between cash crop production and food security: a case study in rural Ghana. *Food Security: The Science, Sociology and Economics of Food Production and Access to Food*.
- *Gutierrez-Velez, V., M. Uriarte, R. DeFries, M. Pinedo-Vasquez, K. Fernandes, P. Ceccato, W. Baethgen, and C. Padoch. in press. Land cover change interacts with drought severity to change fire regimes in Western Amazonia. *Ecological Applications*.
- *Wood, S., A. S. Jina, M. Jain, P. Kritjanson, and R. DeFries. in press. Smallholder farmer cropping decisions related to climate variability across multiple regions. *Global Environmental Change*.
- Meyfroidt, P., Carlson, K., Fagan, M., Gutierrez-Velez, V., Macedo, M., Curran, L., DeFries, R., Dyer, G., Gibbs, H., Lambin, E., Morton, D. and Robiglio, V. in press. "Multiple pathways of commodity crop expansion in tropical forest landscapes." *Environmental Research Letters*.
- Gaveau, D., M. Salim, K. Hergoualc'h, B. Locatelli, S. Sloan, M. Wooster, M. Marlier, E. Molidena, H. Yaem, R. DeFries, R. Nasi, L. Verchot, D. Murdiyarso, P. Holmgren and S. D. 2014. An extreme fire event: haze and greenhouse gas emissions from Sumatra, Indonesia, during 2013 a non El Nino year. *Scientific Reports* **4**(6112): 1-7.
- DeFries, R., M. Herold, L. Verchot, M. Macedo, and Y. Shimabukuro. 2013. Export-oriented deforestation in Mato Grosso: Harbinger or exception for other tropical forests? *Philosophical Transactions of the Royal Society B* **368**.
- *Gutierrez-Velez, V. and R. DeFries. 2013. Annual multi-resolution detection of land cover conversion to oil palm in the Peruvian Amazon. *Remote Sensing of Environment* **129**:154-167.
- *Jain, M., P. Mondal, R. DeFries, C. Small, and G. Galford. 2013. Mapping cropping intensity of smallholder farms: a comparison of methods using multiple sensors. *Remote Sensing of Environment* **134**:210-223.
- Liu, J., V. Hull, M. Batistella, R. DeFries, T. Dietz, F. Fu, T. Hertel, R. Izaurralde, E. Lambin, S. Li, L. Martinelli, W. McConnell, E. F. Moran, R. Naylor, Z. Ouyang, K. Polenske, A. Reenberg, G. Rocha, C. Simmons, P. Verburg, P. M. Vitousek, F. Zhang, and C. Zhu. 2013. Framing sustainability in a telecoupled world. *Ecology and Society* **18**:26.
- *Marlier, M., R. DeFries, A. Voulgarakos, P. Kinney, J. Randerson, D. Shindell, Y. Chen, and G. Faluvegi. 2013. El Nino and health risks from landscape fire emissions in Southeast Asia. *Nature Climate Change* **3**:131-136.
- Yang, J., D. Morton, Y. Jin, G. J. Collatz, P. Kasibhatla, G. van der Werf, R. DeFries, and J. Randerson. 2013. Long-term trends and interannual variability of forest, savanna, and agricultural fires in South American fires. *Carbon Management* **4**:617-638.
- Brando, P., M. Coe, R. DeFries, and A. Azevedo. 2013. Ecology, economy and management of an agro-industrial frontier landscape in the southeast Amazon. *Philosophical Transactions of the Royal Society B* **368**.
- Macedo, M., M. Coe, R. DeFries, M. Uriarte, P. Brando, C. Neill, and W. Walker. 2013. Land use-driven stream warming in southeastern Amazonia. *Philosophical Transactions of the Royal Society B* **368**:20120153.
- Morton, D., Y. Le Page, R. DeFries, G. J. Collatz, and G. C. Hurtt. 2013. Understory fire frequency and the fate of burned forests in southern Amazonia. *Philosophical Transactions of the Royal Society B* **368**:20120163.
- *Fagan, M., R. DeFries, S. Sesnie, J. Arroyo, W. Walker, C. Soto, R. Chazdon, and A. Sanchun. 2013. Land cover dynamics following a deforestation ban in northern Costa Rica. *Environmental Research Letters* **8**:034017.

- Karanth, K., L. Naughton-Treves, R. DeFries, and A. Gopaldaswamy. 2013. Living with wildlife and mitigating conflicts around three protected areas. *Environmental Management* **52**:1320-1332.
- Karanth, K., A. Gopaldaswamy, R. DeFries, and N. Ballal. 2012. Assessing patterns of human-wildlife conflicts and compensation around a Central Indian protected area. *PLoS One* **7**:e50433.
- Johnston, F., S. Henderson, Y. Chen, J. Randerson, M. Marlier, R. DeFries, P. Kinney, D. Bowman, and M. Brauer. 2012. Estimated global mortality attributable to smoke from landscape fires. *Environmental Health Perspectives* **120**:695.
- Karanth, K., R. DeFries, A. Srivathsa, and V. Sankaraman. 2012. Wildlife tourists in India's emerging economy: Potential for a conservation constituency? *Oryx* **46**:382-390.
- DeFries, R., E. C. Ellis, F. S. I. Chapin, P. A. Matson, B. L. Turner II, A. Agrawal, P. J. Crutzen, C. Field, P. Gleick, P. Kareiva, E. Lambin, D. Liverman, E. Ostrom, P. Sanchez, and J. Syvitski. 2012. Planetary opportunities: A social contract for global change science to contribute to a sustainable future. *BioScience* **62**:603-606.
- *Macedo, M., R. DeFries, D. Morton, C. Stickler, G. Galford, and Y. Shimabukuro. 2012. Decoupling of deforestation and soy production in the southern Amazon during the late 2000s. *Proceedings of the National Academy of Sciences* **109**:1841-1846.
- Uriarte, M., M. Pinedo-Vasquez, R. DeFries, K. Fernandes, V. Gutierrez-Velez, W. Baethgen, and C. Padoch. 2012. Depopulation of rural landscapes exacerbates fire activity in Western Amazon. *Proceedings of the National Academy of Sciences* **109**:21546-21550.
- Carpenter, S. R., et al. (DeFries one of ten authors). 2012. Program on ecosystem change and society: an international research strategy for integrated social-ecological systems, *Current Opinion in Environmental Sustainability*, 4(1-5).
- Davidson, E., et al. (DeFries one of 14 authors), 2012, The Amazon basin in transition, *Nature*, **481**, 321-328.
- *Gutierrez-Velez, V., R. DeFries, M. Pinedo-Vasquez, M. Uriarte, C. Padoch, W. Baethgen, K. Fernandes, and Y. Lim (2011), High-yield oil palm expansion spares land at the expense of forests in the Peruvian Amazon, *Environmental Research Letters*, **6**, 044029.
- Chen, Y., J. Randerson, D. Morton, R. DeFries, G. J. Collatz, P. Kasibhatla, L. Giglio, Y. Jin, and M. Marlier. 2011. Fire season severity in South America using sea surface temperature anomalies, *Science*, **334**(6057), 787-791.
- Yackulic, C., M. Fagan, M. Jain, A. Jina, Y. Lim, M. Marlier, R. Muscarella, P. Adame, R. DeFries, and M. Uriarte. 2011. Biophysical and socioeconomic factors associated with forest transitions at multiple spatial and temporal scales. *Ecology and Society* **16** (3).
- Bowman, D., J. Balch, P. Artaxo, W. J. Bond, M. Cochran, C. D'Antonio, R. DeFries, F. Johnstao, J. Keeley, M. Krawchuk, C. Kull, M. C. Mack, M. Moritz, S. Pyne, C. Roos, A. Scott, N. Sodhi, and T. Swetnam. 2011. The human dimension of fire regimes on Earth. *Journal of Biogeography* 1-14.
- Fernandes, C., W. Baethgen, S. Bernardes, R. DeFries, D. DeWit, L. Goddard, W. Lavado, D. E. Lee, C. Padoch, M. Pinedo-Vasquez, and M. Uriarte. 2011. North Tropical Atlantic influence on western Amazon fire season variability. *Geophysical Research Letters* **38**.
- Hansen, A., C. Davis, N. Pkielek, J. Gross, D. Theobald, S. Goetz, F. Melton, and R. DeFries. 2011. Delineating the ecosystems containing protected areas for monitoring and management. *BioScience* **61**:363-373.
- *Karant, K. and DeFries, R. 2011. Nature-based tourism in Indian protected areas: New challenges for park management. *Conservation Letters* **4**:137-149.
- Morton, D., R. DeFries, J. Nagol, C. Souza, E. Kasischke, G. C. Hurtt, and R. Dubayah. 2011. Mapping canopy damage from understory fires in Amazon forests using annual time series of Landsat and MODIS data. *Remote Sensing of Environment* **115**:1706-1720.
- DeFries, R. and C. Rosenzweig, 2010. Toward a whole-landscape approach for sustainable land use in the tropics. *Proceedings of the National Academy of Sciences* **107**(46): 19627-19632.
- Freedman, A. H., Buermann, W., Mitchard, E.T.A., DeFries, R.S., and T.B. Smith, 2010. Human impacts flatten rainforest-savanna gradient and reduce adaptive diversity. *PLoS One* **5**(9): e13088.
- Giglio, L., Randerson, J.T., Van der Werf, G., Kasibhatla, P., Collatz, G.J., Morton, D., and R. DeFries, 2010. Assessing variability and long-term trends in burned area by merging multiple satellite fire products. *Biogeosciences Discussion* **7**: 1171-1186.
- *Karant, K. and DeFries, R., 2010. Conservation and management in human-dominated landscapes: Case studies from India. *Biological Conservation* **143**(12): 2865-2869.
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- Vina, A., M.-N. Tuanmu, et al., 2010. Range-wide analysis of wildlife habitat: Implications for conservation. *Biological Conservation* **143**: 1960-1969.
- *Zeigler, S., W. F. Fagan, et al., 2010. Identifying important forest patches for the long-term persistence of the endangered golden-headed lion tamarin (*Leontopithecus chrysomelas*). *Tropical Conservation Science* **3**(1): 63-77.
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- DeFries, R., Karanth, K., and Pareeth, S., 2010. Interactions between protected areas and their surroundings in human-dominated tropical landscapes. *Biological Conservation*, **143**, 2870-2880.
- DeFries, R., and D. Pandey. 2010. Urbanization, the energy ladder and forest transitions in India's emerging economy: Trade-offs and synergies for ecosystem services and human well-being. *Land Use Policy*. **27**: 130-138.
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- van der Werf, G., Morton, D., DeFries, R., Olivier, J., Kasibhatla, P., Jackson, R.B., Collatz, G.J., and Randerson, J.T., 2009. CO2 emissions from forest loss. *Nature Geoscience*. **2**, 1-2.
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- Asner, G., Rudel, T., Aide, T.M, DeFries, R. and R. Emerson. 2009. A contemporary assessment of global humid tropical forest change. *Conservation Biology*. **23**: 1386-1395.
- Bowman, D., Balch, J., Artaxo, P., Bond, W.J., Carlson, J., Cochrane, M.A., D'Antonia, C., DeFries, R., Doyle, J., Harrison, S., Johnston, F., Keeley, J., Krawchuk, M., Kull, C., Marston, J.B., Moritz, M., Prentice, I.C., Roos, C., Scott, A., Swetman, T.W., van der Werf, G., and Pyne, S. 2009. Fire in the earth system. *Science* (324): 481-484.
- DeFries, R., F. Rovero, P. C. Wright, J. Ahumada, S. J. Andelman, K. Brandon, J. Dempewolf, A. Hansen, J. Hewson, and J. Liu. 2009. From plot to landscape scale: Linking tropical biodiversity measurements across spatial scales. *Frontiers in Ecology and the Environment*. doi:10.1890/080104.
- *Songer, M., Aung, M., Senior, B., DeFries, R., and Leimgruber, P. 2009. Spatial and temporal deforestation dynamics in protected and unprotected dry forests: a case study from Myanmar (Burma). *Biodiversity Conservation* (18): 1001-1018.
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- van der Werf, G. R., J. Dempewolf, S. N. Trigg, J. T. Randerson, P. S. Kasibhatla, L. Giglio, D. Murdiyarsa, W. Peters, D. Morton, G. J. Collatz, and R. DeFries. 2008. Climate regulation of fire emissions and deforestation in equatorial Asia. *Proceedings of the National Academy of Sciences*. **105**(51): 20350-20355.
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- *Morton, D., R. DeFries, J. T. Randerson, L. Giglio, W. Schroeder, and G. van der Werf. 2008. Agricultural intensification increases deforestation fire activity in Amazonia. *Global Change Biology* **14**:2262-2276.

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Advisory Committees/Working Groups (selected, last 5 years)

- Lead author, Intergovernmental Panel on Climate Change, Fifth Assessment, 2010 – 2014
- Board of Trustees, Environmental Defense Fund, 2010-present
- Member, National Research Council, Board on Environmental Change and Society, 2011-present
- Member, Scientific Committee for Ecosystem Change and Society (PECS), International Council for Science, 2008-present
- Member, National Science Foundation Advisory Board for Social, Behavioral and Economic Sciences (2013-present)
- Member, National Research Council, Committee on the Assessment of NASA's Earth Science program, 2010-2012
- Chair, Ecosystems, Land Use, and Biodiversity Panel of Decadal Survey for the Earth Sciences, National Research Council, 2005-2007
- Vice-chair, National Research Council, Committee on Earth Studies, Space Sciences Board, 2008-2011.
- Member, America's Climate Choices: Science Panel, National Research Council, 2008-2010
- Member, Terrestrial Carbon Group, 2007-2011
- Executive Editor, *Environment* magazine, 2006-2011
- Editorial Board, *Proceedings of the National Academy of Sciences*, 2007-present
- Editorial Board, *Regional Environmental Change*, journal published by Springer-Verlag, 2003 – 2011.
- Member, Global Observations of Forest Cover, Forest/Land Cover Implementation Team, 2001-present

Ph.D. Students

Awarded:

- M. Jain (co-advised with S. Naeem), "Adaptation to Climate Variability in Social Agro-ecological Systems" (awarded 2014)
- M. Fagan, "The Changing Matrix: Reforestation and Connectivity in a Tropical Habitat Corridor" (awarded 2014)

- M. Marlier (co-advised with K. Griffin), “Contributions of Biomass Burning to Air Quality Degradation” (awarded 2013)
- V. Gutierrez-Velez, “Oil Palm Expansion and Land Cover Changes in the Peruvian Amazon: Implications for Forest Conservation and Fire Management” (awarded 2013)
- M. Macedo, “Tropical Deforestation and the Land-Water Interface” (awarded 2011)
- K. Wurster, “Using MISR to Assess the Impact of Charcoal Production on Forest Regeneration Rates in Southeastern Senegal” (awarded 2010)
- S. Zeigler, “Incorporating Landscape in Population Viability Analysis: Improving Generic Modeling Platforms for Endangered Species Conservation” (awarded 2010)
- D. Morton, “Savannization of a Tropical Forest Frontier: Carbon Consequences of Climate and Anthropogenic Fire from a Height-Structured Ecosystem Model” (awarded 2008)
- J. Dempewolf, “Fire Dynamics and Woody Cover Changes in the Serengeti-Mara Ecosystem 2000 to 2005: A Remote Sensing Approach” (awarded 2007)
- L. Anderson (co-advised), “Analyzing the Impact of Participatory-Developed Conservation Policies in the Negril Environmental Protection Area, Western Jamaica” (awarded 2007)
- M. Songer, “Dynamics of Non-Timber Forest Product Extraction in a Protected Tropical Dry Forest Area in Southeast Asia” (awarded 2006)

Current:

- M. Agarwala, “Forest Degradation and Governance in Central India: Evidence from Ecology, Remote Sensing and Political Ecology Forest Degradation in Tropical Deciduous Forests”
- M. Cattau, “Tropical Peat swamp Forest Loss in Indonesia: Linking Landscape Connectivity, Seed Dispersal, and Carbon Storage”
- B. Clark (co-advised with C. Palm), TBD
- N. Schwartz (co-advised with M. Uriarte), TBD
- A. Neelakantan, TBD